BULLETIN OF THE DECCAN COLLEGE RESEARCH INSTITUTE

1952

T. N. S. D. A.

Vol. XIV. No. 2

99

BULLETIN
OF THE
DECCAN COLLEGE RESEARCH INSTITUTE

September 1952

POONA

CONTENTS

A Philosophical Analysis of the Alpha-Phoneme Theory in Relation to the problem of Speech-Structure—By C. R. SANKARAN 87

Rebirth and Release in the Adhyātmarāmāyaṇa—By H. G. NARAHARI... 106

On *cakrán ná* in the Ṛgveda X. 95·12·13—By M. A. MEHENDALE ... 109

A Note on the Epistemological Significance of the Alpha-Phoneme and the Alpha-Phonoid Theories—By C. R. SANKARAN ... 119

Some Technical Aspects of Pottery Drawing—By S. B. DEO and Z. D. ANSARI 123

A Survey of Rural Housing in a Deccan Village—By V. M. DANDEKAR... 132

Reviews 151

(*Issued on 12th March 1955*)

Printed by Shri V. G. MOGHE at the Bombay University Press, Fort, Bombay 1
and
Published by Dr. S. M. KATRE for the Deccan College Post-greduate and Research Institute, Yeravda, Poona 6.

4010
OFFICE OF THE DIRECTOR OF ARCHAEOLOGY
1071
26 AUG 1969
GOVT. OF MADRAS, MADRAS

A PHILOSOPHICAL ANALYSIS OF THE ALPHA-PHONEME THEORY IN RELATION TO THE PROBLEM OF SPEECH-STRUCTURE*

By

C. R. Sankaran

The profile theory of Prof. E. W. Scripture is extended in my theory so as to mean that the components of the articulation, which is the three-dimensional complex are having one-one relation with the components of the sound waves. For, unlike the earlier approach to the problem, which regarded the sound waves as uni-dimensional for purposes of, say, the Fourier analysis, *implying* thereby that the components of the sound waves are not readily comparable with the articulatory components, we proceed to regard the sound waves as a multi-dimensional (space) continuum *congruent* with *time* and *strictly correlated* with articulation. For clarity, it is pointed out here that until the formalution of the Alpha-phonoid theory the assumptions that held sway were only :—

(1) there is a correlation between the articulation and the sound waves and that.

(2) this correlation is in a sense absolute, *i.e.*, an observable difference in articulation is correlated with *some* observable difference in the sound-waves.

I consider any consonant-vowel configuration (actually articulated) as the starting point of my investigation. The oscillogram recorded with precision up-to-date cathode-ray oscilloscopes suitable for such an advanced mathematical work which I have been able to procure in my laboratory, gives a physical picture of the situation which I analyse into a four-point relation of *order* as being made up of consonant sound-profiles, non-consonant sound-profiles, non-vowel sound-profiles and vowel profiles. This resolution into a ' four-point ' relation of order is in the wake of projective geometry which is sometimes called the geometry of position.

The ' four-point ' relation of order in projective geometry is in the wake of Veblen's system of a ' three-point ' relation of order replacing the notion of ' between-ness ' in Peano's system. Note that I have always taken care to either

* This in substance is the epitome of the address read at the 17th Sessions of the All-India Oriental Conference in Ahmedabad on the 31st October, 1953 at 10 a.m., at the Samskara Bhavan in Vidya Vihar, Ahmedabad.

The full address, entitled " Metamathematics, Metalogic and Metalinguistics with special reference to the Alpha-Phoneme and the Alpha-Phonoid Theories," will it is hoped, be printed later in the Proceedings of the Conference.

enclose within single inverted commas or to *italicise* the term 'between' when I speak of an *interval* 'between' the consonant and the vowel in any consonant-vowel configuration under consideration. This is to indicate that we are operating at the *Metalanguage level.* It is the metalanguage we use when we construct a theory of language. The distinction of levels of language is a necessary prerequisite of logic. Bertrand Russell's antinomy demonstrates that not every combination of words can be admitted as a meaningful statement. The sentence "the property *determined* is determined" is ruled out from the domain of meaningful sentences due to Russell's formulation of his theory of types.

When we talk of a property of a *particular*, we are clearly operating at the meta-logical level. At the level of the Alpha-phoneme even the 'instantaneous entities' are not seen as separate or together involving dyadic asymmetric relation ; at that epoch, which is beyond space, time and becoming, there is simply no relationship at all.

Now in the Alpha-phoneme theory, 'between' the consonant and the vowel, there is a mind-construct which is the 'indefinable Infinite.' The Alpha-phoneme is like the 'point-singularity' of E. A. Milne. This conception agrees also in essence with Lemaître's hypothesis which traces the state of the universe backwards to a point-singularity at which epoch no propositions can be asserted about the state of affairs. "It is transcendent, as becomes the event of the creation of the Universe."

Now, therefore, starting from the above (*ūrdhva-mūlam*), the transcendent Alpha-phoneme, we come to the 'form' (*sākāra* the *vyakta*) which suggests this 'formless' (*nirākāra*—the *avyakta*). This 'form' is the Alpha-phonoid. It is a uniform probability distribution of 'event-particles' forming a hyper-spherical space. *Āytam* is a particular case of the Alpha-phonoid. The Alpha-phonoid is a generalized *Āytam*-phenomenon. The term generalization is used here, I need hardly remind you, in the strict sense in which mathematicians understand the term.

Now the geometrical alpha-phoneme theory I can translate to you as the fourth state of consciousness. It is *Avyavahāryaḥ*—transcendental—and *prapañcopaśa maḥ*—devoid of all phenomenal existence. In this super-conscious state, the existence of mind is also denied. Needless it is to emphasise that the highest form of thinking is *Negative Thinking.* Pure consciousness becomes conscious of itself. It is ineffable in ordinary human language. The Alpha-phoneme is *amātraḥ*, and in the mathematical language, it is *dimensionless.*

Does not a philosophical analysis of mathematical thinking which is the basis of the Alpha-phoneme theory, reveal that we occasionally at least have a glimpse of this fourth state of consciousness ? We then experience transvaluation of values through our mind. A philosophical analysis of mathematical thinking is always revealing, pointing out to an ultimate superconsciousness.

GOVT. OF THE DIRECTOR (F... 26 AUG 1964

I have already stated in my monograph that " In our consonant-vowel con-figuration, we construct a continuum of point-instants as it were, in space-time as 'groups' of 'events' since the sound wave conceived as three-dimensional is *instant* by *instant* correlated with the three-dimensional articulatory complex (*instant* by *instant*) as in Robb's theory.

" Here obviously an 'element' of time is called an *instant* and is to be regarded as a fundamental concept. The system of geometry which is envisaged to be built up in the wake of the Alpha-phoneme theory in its present form, will therefore ultimately assume a sort of four-dimensional character, that is to say, any element of it is to be determined by four co-ordinates. The bases of the whole logical super-structure are the ideas of *before* and *after*. I give them as Robb has done the philo-sophical and physical meanings more or less on the self-same lines. In a general way, it can be described that our continuum of *speech-elements* or 'profiles' (which are conceptualised abstractions) in any cnsonant-vowel configuration (with *zero* as the acoustico-articularory *interval* in time 'between'), *implies* that the time-relations and space-relations are to be regarded both as relations of one continuum here."

In this geometry of time and space there is a marked departure from the generally accepted view that an instant can be in two places at once and so the postulate, " If an instant A be neither before nor after an instant B, the instant A is identical with the instant B," is surrendered. No doubt this postulate holds good " for the set of instants of which any one individual is directly conscious, or which any single particle occupies."

But for the universe in general is substituted the postulate : " If A be any instant there is at least one instant distinct form A which is neither before nor after A."

Robb is careful to say that " If I am directly conscious of the instant A then any instant such as that here postulated will be one of which I am not directly conscious, but only indirectly apprehend and which is, as I say, *elsewhere*." Clearly this *elsewhere* is universal consciousness.

" While the set of instants of which any single individual is conscious or which any single particle of matter occupies have a linear order, the set of instants for the universe in general appear to have a *conical order*."

Robb has given it this name for as he himself explains " It may be illustrated by means of ordinary geometric cones ; while it contains within itself the possibility of defining particular sets of instants having a simple linear order such as that with which each of us is familiar."

With the introduction of co-ordinates the system is equivalent to the analytical geometry of Minkowski.

" In such a system as he employed, one co-ordinate is measured along a line corresponding to one lying within the cones in the model (an inertia line), and represents what clocks purport to measure. The other three co-ordinates are measured along lines corresponding to those lying outside the cones (or separation lines) and these represent what we call spatial distances.

" Now, as the *before* and *after* relations from which our whole theory is built up have a temporal significance, we appear to have absorbed the theory of space in a theory of time, in which instants have a conical order instead of the purely linear order which they are generally regarded as having. An instant for the universe in general is identified by four co-ordinates in this theory instead of merely one co-ordinate as is generally assumed."

Now the meaning of the statement of mine that " the ' elemental profiles ' forming really speaking a four-dimensional continuum have a bi-unique correspondence with a part of time itself," must be clear to you. This speaks of the correlation of experience between individual consciousness and the Universal consciousness. It is interesting to note that Eddington takes precisely this stand on such a correlation of experience.

So there is an extension of a hierarchy of *individual consciousness* to pure universal consciousness in the correlation of the linear order of a particular set of instants and the conical order of instants. There is a *pure total consciousness* observing each particular observer. In this connection I am inclined to agree with Prof. C. T. K. Chari, regarding J. W. Dunne's work that " the postulation of an observer at infinity is from the mathematical stand-point, a piece of tactlessness on his part......but the postulate has a far different significance for the speculative philosophy of the West and the East......The Ultimate Self, Dunne taught, is not in the linear time of physics and Its Immortality is not to be thought of as an endless prolongation of the time of our empirically describable consciousness. An indefinite conception, it will be said. But does not the Self glory in being indefinite? Can It have a credible, visible existence, a vulgar roundness and relief ? "

Now the Alpha-phoneme construction as I have shown in my monograph is wholly subjective. Eddington had singled out the cosmical number N as a test case. For, " knowledge of the number of elementary particles had seemed least likely to be tainted with subjectivity," but even N is *debunked.*

Even the laws of microscopic physics turn out to have been imposed by the mind.

In a truly scentific work we cannot cut ourselves off from the deeper roots of our being. There is no escape from the Invisible before one can act with effect in the realm of space and time. " Seek ye *first* the kingdom of Heaven." It implies re-birth in the Eternal, transcending the world of space and time. " Then, and then only do all manifestations appear for what they really are." Undoubtedly, there is a chain of communication each link being a step which leads from the trans-cendental knowledge of eternal experience to the ordinary pragmatic knowledge of sense perceptions.

The Alpha-phoneme can be equated with *Parā-Vāk*. " *Rūpa* we can know and analyse by the aid of science. *Nāma* by the aid of philosophy ; but *Swarūpa* ? " It would seem that some third instrument is needed for that consummation of knowledge.

चत्वारि वाक् परिणमिता

The Alpha-phonoid is the *Paśyantī*. It is *Ghanībhūta*. It is the *physical representation* of the consciousness, which in my theory does not cognize consonant or vowel, and therefore it resembles the *Suṣuptasthāna* of the *Māṇḍukyopaniṣad*. It is independent of the empirical. While the Alpha-phoneme is the *Nāda* the Alpha-phonoid is the *Bindu*.

I stress again that the construction of the Alpha-phoneme is only an auxiliary idea and that it is symbolic.

I may claim as the representative of both Tolkāppiyar and Bhartṛhari. Per-haps more correctly speaking, I extend Tolkāppiyar's empirical conception, being more true to Bhartṛhari's tradition as you will see. I have generalized the Āytam-concept of the former into the Alpha-phonoid which is given precisely the same meaning as " constanty of *C* expressed as ' invariance ' of the four-dimensional ' interval .' " The Alpha-phonoid looked at from one point of view is the physical ' interval ' *between* the consonant and the vowel in any consonant-vowel configuration, where the amplitude is reduced to an insignificant amount.

Looked at from another point of view, the Alpha-phonoid is perhaps the time-interval of 3 milliseconds between two successive sweeps in the recent device of the Bell Telephone Laboratories, *viz*., the Visible Speech Apparatus,. This electronic device gives what is technically known as the sweep-rate of 333 per second.

This time interval of 3 milliseconds is very much smaller than any time signi-ficant in the production of speech sounds and therefore the 333 per second sweep-rate is fast enough to assure that no significant speech detail fails to be portrayed.

Now it is proposed to determine the minimum standard duration of a ' unit information cell ', through a fascinating theoretically devised experiment. This is the well-defined goal of my collaborators and myself, in our programme of the study

of speech-structure from the view-point of the Alpha-phoneme theory. This is leading us on to, comparatively speaking, newer branches of knowledge like neuro-physiology and mathematical biophysics, outstanding contributions to which from N. Rashevsky in recent times have been referred to in the addendum to our latest paper " Time and speech-structure." As I have said, our well-chalked out plan is the determination of the minimum standard duration of a ' unit information cell ' in the physical stimulus as well as in the neurological and psychological responses ; the minimum common duration of all these three will, it is hoped, serve as the key ' interval ' for the *basic* representation of speech-structure (the Alpha-phonoid).

Now this ultra-elementary constituent which is the *minimum standard duration* of a ' unit information cell ' in the physical (acoustical) stimulus as well as the neurological and psychological responses will give a *physical significance* to a non-Archimedean Time-order.

The Alpha-phoneme theory stresses that the idea of *order* should precede the idea of *measurement*. The conception of the latter is only constructed from the former. Robb's conical order of the set of instants for the universe in general is only a scaffolding in the erection of the theory of the Alpha-phoneme. Another such scaffolding is E. A. Milne's Kinematic Relativity. His assumption too is that temporal before-after, is logically more primitive than spatial ' between '. Milne's epistemological approach to the problem of time has a deep philosophical significance. In Kinematic Relativity, the rigid measuring rods are entirely dispensed with. The forward direction of time is not distinguished from the backward direction in classical dynamics. These reversible equations are employed even by Einstein's General Theory of Relativity. The law of entropy distinguishes $+dt$ from $-dt$. This irreversibility of thermodynamics from the view-point of the General Theory of Relativity is due to our ignorance of the detailed values of the co-ordinates of particles in a crowd.

In Milne's theory, there are two scales of time, a ϕ-*scale* and a *t-scale*. For all fundamental observers, ϕ-time is an invariant giving the time honoured simultaneity throughout the universe where the reversible equations of classical physics are employed. It is the *ephemeral* or *dynamical* time recorded by a chronometer or the rotating earth, for instance, which Milne distinguishes from the *absolute* or *Kinematic* time t, recorded by a radio-active clock. The relation between ϕ and t is :—

$$\phi = t_o \log \frac{t}{t_o} + t_o,$$

where, t_o is the age of the universe in t-time, say 4×10^9 years.

Here it must be noted that Prigogine relates his thermodynamic time (ϕ) to Newtonian time (t) by an apparently identical equation for certain equilibrium

conditions. Regarding the nomenclature, " the ' cross-over ' is due to a different definition of the epoch at which the time scales are to coincide."

Milne's t-scale is the deeper and the more significant measure of time. Here, the Lorentz-Einstein transformation is valid and also the equations of motion are irreversible.

In Einstein's " Special theory of Relativity " and in Milne's t-scale there is no single linearly ordered time-series for all observers, but " we can establish a definite correlation between the linearly ordered time-series of different observers," the unique meaning of " simultaneity " being lost in this scheme.

We may choose to describe the motion of a dynamical system such as the rotating Earth in terms of t-time. At the present instant $\tau = t$ and $d\tau /dt = 1$, the two scales being indistinguishable, then as we go backwards in history, the periods of rotation shorten. At any moment, it is proportional to the value of t at that moment which is the kinematic time elapsed since the creation. Thus it follows that creation is separated from us by only a finite interval of t-time and it is infinitely remote in τ-time.

"The non-mathematician is apt to be puzzled by the statement that whether the creation happened a finite or an infinite time ago, depends upon how our clocks are graduated.

" Suppose that for the last million years of τ-time, the t-time reckoning kept pace with it exactly ; that in the million years of τ-time before that the atom's frequency of vibration was only half as great, so that the atomic clocks only registered half a million years ; in the million years of τ-time before this the atom's frequency of vibration was only half this again, so the atomic clocks registered only a quarter of a million years and so on. If we suppose that τ-time extends backwards to infinity, the total time registered by the atomic clock is :—

$(1 + \frac{1}{2} + \frac{1}{4} +)$ ...million years. Since the sum of the series is 2, the atomic clocks would give a beginning of time, or Creation, just 2 million years ago."

Robb concludes his great work by mentioning an important bearing on general philosophy, the theory (built upon the assumption of the temporal before-after, which is logically more primitive than spatial ' between ') has :

" The fundamental properties of time must, on any theory, be regarded as possessing a character which is not transitory, but in some sense persistent ; since otherwise, statements about the past or future would be meaningless.

" We here touch on the difficult problem as to the nature of ' universals ', a problem which has been much discussed by philosophers, but appears to be still far from a satisfactory solution.

" Though space may be analysable in terms of time relations yet these remain in their ultimate nature as mysterious as ever ; and though events occur in time yet any logical theory of time itself must always imply the Unchangeable."

No evidence to prove that the notion of an ' instant ' corresponds to anything in the world of sense-data is obtainable " from a psychological study of the passage of time in individual experience ; for the (ultra) elementary constituent of perception extends in the time-series over what may be called a *duration*, which, since it is *sui generis*, cannot be defined in terms of anything else."

Time is just itself—*akhaṇḍopādhi*. Out of the finite regions of overlapping events met in immediate consciousness, an idealised time is constructed by the mind. The alpha-phoneme theory leads to the consequence that time can *not* be assimilated to the Cantor-Dedekind type of continuity. Re-examination of our ordinary intuitions of Time leads to an ' Indeterminate ' entity—*anirvacanīya*. We leave behind the two-valued logic of Aristotle at such a metalogical, metamathematical and metalinguistic level. The Alpha-phoneme theory has an ' Indeterminate ' value in a trichotomous logic.

The Alpha-phonoid is the measure (*mitiḥ*) like the *suṣuptasthāna* which marks the completion (*apītiḥ*) of three relative states of consciousness, determining therefore, the other two states. The set of field equations envisaged to be deduced from the Alpha-phonoid, I need hardly point out, correspond on the one hand to the *svapnasthāna* and the *madhyamā* on the other. It is intermediary between the manifest speech *vaikharī*—the vowels and the consonants, broadly speaking—and the Alpha-phonoid. It is a remembered-sensation.*

" It is a universal form of thought that a remembered-sensation is to be regarded, not as a constituent of knowledge important in itself, but as an indirect apprehension of the past sensation of which I have not direct awareness. It is, in short, a sympathetic knowledge of the past sensation."

In the first three planes of consciousness, *jāgaritasthāna* (or the *vaikharī*), *svapnasthāna* (or the *madhyamā*) and *suṣuptasthāna* (or the *paśyantī*), existence is intuited in relation to something that is external. But the consciousness in the *turīya* is unrelated existence. It is not conditioned by time, space or causation. In that consciousness, the three kinds of differentiation, namely *vijātīya bheda* (generic differences), *svajātīyabheda* (differences amongst the members of the same species) and *svāgata bheda* (internal differences of limbs or parts) are negated. Divisions and differentiations are brought about in our mind by the play of time, space and causation. The transcendental is devoid of all these. It is wrong to describe this

* From one point of view it is also more precise to evaluate the ' primitive ' temporal experiences at the articulatory level as the *Jāgaritasthāna* and the corresponding ' primitive' temporal experiences at the acoustical level as the *svapnasthāna*.

colourless, contentless, absolute consciousness as an abstraction or negation in the Buddhistic sense of *śūnyam*. "This Nothing then is merely a something beyond description." Is it a wonder, therefore to an Indian mind like mine, that this form of the highest negative thinking has so much appealed, resulting in the construction of the Alpha-phoneme?

Time serves for work and the timeless (or 'eternity') for fulfilment. The Alpha-phoneme is *unrelated* (*avyavahāryam*) and unobservable (*adṛṣṭam—agrāhyam—alakṣaṇam*). Order is the theoretical basis from which measurement is constructed.

The Alpha-phonoid corresponds to the consciousness of deep sleep which is not identified with any kind of percept, or concept or memory. It is *ghanībhūta*, independent of the empirical. It is the Bindu, an undifferentiated existence holding the unmanifested germs of varied differentiation.

Should our theoretically devised experiment outlined in our latest paper "Time and Speech-structure" in the realm of Neurophysiology to determine the standard minimum duration of a 'unit information cell' succeed, we should then have given a physical significance to yet another symbolism belonging to the newer mathematics of Veronese and Hilbert (with all its implications to scintific philosophy) which to my mind, is only still another scaffolding or simile to connote Time which is really *akhaṇḍopādhi*.

In any consonant-vowel configuration during actual articulation by means of any precision instrument, the physico-physiological existence of the *point* where the consonant ends and where the vowel begins can *not* be observed.

Hence, I say, that it is unnecessary to assume the physico-physiological existence of such a change-point. We now therefore, land ourselves into a transcendental logic. There is a mind-construct (the alpha-phoneme) 'between' the consonant and the vowel. This is an *unrelated* existence. A *related* existence, the alpha-phonoid, suggests this.

This *related existence* is the *minimum standard duration* of a 'unit information cell' namely, the ultra-elementary constituent, an agreed number, for idealised signalling, independent of the empirical, when the threshold duration of an acoustical (physical) intermittent stimulus is given with the consequence of continuous neurological and psychological responses.

Since we operate on two orders of infinitesimals (say, at least the physical stimulus and the neurophysiological response) simultaneously, the resulting order is non-Archimedean. The (ultra) elementary constituent of perception extends in the time series over what may be called a *duration*, which is also more precisely expressible as an infinitesimal segment of a non-Archimedean order.

The *related existence* of this type is undifferentiated existence holding the unmanifested germs of varied differentiation. From this *related existence* are derived the field-equations which are the 'disposable parameters' and which closely correspond to the mental impressions—*praviviktabhuk.*—These field equations will serve as the comprehensive frame-work into which quantitatively we can assign all the phonetic phenomena known to us such as vocoids, contoids, assimilation, dissimilation, apheresis, syncopation, retroflex, alveolar, isogloss, voiced and voiceless consonants in certain positions.

It is pretty obvious that the philosopher will get an immediate satisfaction that from the purely epistemological analysis of the Alpha-phoneme and alpha-phonoid theories we arrive, as it were, at the same ' picture ' constructed by our ancients.

The Alpha-phoneme is a direct experience of *continuity* while the alpha-phonoid is an ' intuitive (*i.e.*, not based on premises for it is an agreed number independent of the empirical for idealised signalling to ensure a pragmatic operational efficiency) belief ' as to physical continuity. This distinction between the alpha-phoneme and the alpha-phonoid needs to be made. It is only for empirical, convenience the alpha-phonoid is taken as the *same* point at infinity but with duration, the alpha-phoneme being the point at infinity without duration.

In this connection the following telling verses of Bhartṛhari are to be borne in mind :—

सर्वार्थं रूपता शुद्धिः ज्ञानस्य निरुपाश्रया। ततोऽप्यस्य परां शुद्धिमेके प्राहुररूपिकाम् ॥
उपप्लवो हि ज्ञानस्य बाह्याकारानुपातिता। कालुष्यमिव तत्तस्य संसर्गे व्यतिभेदजम् ॥
(Vākyapadiya—third Kāṇḍa IIIrd Samuddeśa संसर्गसमुद्देश verses 54 & 55)

" The conception of a dimensionless parameter (the alpha-phoneme) represents definitely an abstract *negative* thinking ; but the alpha-phonoid concept, positive in a purely physical sense, is a climb-down to the less abstract and a communicable medium for interpreting our ultimate subjective experience." (*Cf.* C. R. Sankaran, A Contribution to the Study of Speech-structure, BDCRI, vol. 12, p. 229).

The alpha-phonoid is, therefore, in short, an inferior alpha-phoneme, purely for empirical convenience, to ensure a pragmatic operational efficiency.

The synthesis of the alpha-phoneme and the alpha-phonoid to which I pay homage as an ardent modern represenative of *Nādopāsakas*, I regard as the highway of highways of phonetic science in particular, and Linguistics in general. This is only the *śabdādvaita*, in modern garb. I have been arriving at it quite independently in a sense, although the *samskāras*—the ancestral memories, the glorious heritage of the past—are running in my blood. I have been able to gather the correspondences only recently, which I have ventured to place before you. I lay no claim to have made a systematic study of the philosophical literature either

of the East or of the West. My philosophy is only that of a Phonetician who has been traversing his own path, observing the problem of speech-structure from diverse points of view and this is perhaps my latest discovery that my path has converged to the one to which the ancient philosophic thinkers in our country were also particularly led. It is interesting to note that modern scientific thinkers like Eddington and Robb also converge to the same goal.

Perhaps there is nothing strictly new in my own experience. It is only uncovering an already existing situation. This is perhaps the real education as our very sacred books teach us. I have tried in this address too as in all my works, to impart at least a fraction of the excitement and exhilaration which I can claim, has been ever attending the investigations on speech stucture in which my devoted collaborators and I are engaged at our Phonetics Laboratory in the Deccan College Research Institute. " In the age of reason, faith yet remains supreme; for reason is one of the articles of faith."

In Einstein's words, " The most beautiful emotion we can exprience is the mystical. It is the sower of all true art and science. He to whom this emotion is a stranger, who can no longer wonder and stand rapt in awe, is as good as dead...... The cosmic religious experience is the strongest and the noblest thing behind scientific research which is derived from it...Religion without science is blind, science without religion is lame."

I now conclude my address with that immortal Ṛk, while celebrating the glorious wedding of the direct experience of the Alpha-phoneme—the *svayamprakāśita, jyotisvarūpa, anubhavāmṛta*—with the ' intuitive belief'—*śraddhā*—as to the *physical continuity*, due to the notion of the alpha-phonoid in speech-structure.

Time as *Eternal Now* transcends all empirical determinations. It is lawful to regard logic from *within*, as based upon facts of an order which have their abode in the constitution of the Mind.

उत त्वः पश्यन्न ददर्श वाचं
उत त्वः शृण्वन्न शृणोत्येनाम् ।
उत त्वस्मै तन्वं विसस्रे
जायेव पत्य उशती सुवासाः ॥

(*Ṛg Veda*, VIII, ii, 23.4).

ADDENDUM I

Now, the Alpha-phoneme construction itself is the postulation of an entity to remove all the contradictions. This entity is the Being, so to say. Such a postulation is known as *Arthāpatti* especially in post-Śaṅkara Advaita. Even *Arthāpatti* as a *Pramāṇa*, a valid source of knowledge or proof, cannot prove the unrelated existence of the Alpha-phoneme. For, the Being is a direct experience. *Arthāpatti* can only point towards the Reality. In this respect alone *Arthāpatti* is superior to all other *Pramāṇas*. The Alpha-phoneme is not *Pramāviṣaya*, an object of epistemic act. All *Pramāṇas* are *Pramākaraṇas, i.e.*, they produce epistemic acts.

Pramā or true knowledge, at the finite level is *Vṛttijñāna* or epistemic act. The Alpha-phonoid belongs to this region. It is a related existence, undifferentiated, holding in itself unmanifested germs of varied differentiation.

When the acoustical (physical) stimulus is intermittent, the threshold duration which gives continuous neurological (and psychological) responses is the Alpha-phonoid. Note how what ordinarily is assumed to be continous becomes intermittent, and *vice versa* here. Therefore, both the ultimate ' continuity ' and the ' discontinuity ' are comprehended by what appears at least on the surface, as the most bizarre and perplexing concept of a non-Archimedean Time-order, in the wake of newer mathematics due to Veronese and Hilbert. The heuristic linguist chooses either the series of acoustic observables or the articulatory observables, separately as far as possible, only to ensúre a pragmatic convenience.* This has been the pratice from the ancient times onwards. Witness *Pāṇini's* sūtra : *Tulyāsya Prayatnam Savarṇam*. Here the ' places of articulation ' are taken together with the *Ābhyantaraprayatna's*, four in number. These *Ābhyantaraprayatna's* are in essence articulatory in character, while the eleven *Bāhyaprayatna's* (including accentuation) are predominantly the acoustical criteria. The modern X-ray workers too have emphasised the articulatory character, while the physical scientists have been mainly swearing by the acoustic phenomena. I combine both and the contradiction is removed by the construction of the Alpha-phoneme.

Śaṅkara in his own time had to point out to the prosaic orthodox schools that what they were doing was only Suṣkatarka. Likewise, I too point out the limitations imposed by the very empirical approaches chosen by these camps of workers, working in isolation. Again, I have to wage a battle against the unorthodox schools too, even as Śankara did in his own time. (*Cf.* P. T. Raju, Idealistic Thought of India, London, 1953, pp. 123-127).

* The distinction between the ' actor ' (the speech elements) and the ' stage ' (space-time structure) is maintained in all such investigations. But in my approach speech-elements are the *pure shape* of (space—) time itself. *Cf.* E. Schrödinger, Nature and the Greek. Cambridge at the Univ. Press. 1954. 14 ; see also B.D.C.R.I. 12-403 fn. 104.

These unorthodox schools are the mathematical-biophysicists and the Information-theorists, who are lopsided in their specialised interests, although they have broken away from the old orthodoxy. They swear, for instance, separately by such tools as the Boolean Algebra or the logarithm to the base 2, respectively. They have not leapt over one ' step ' (or barrier, as you will), into a unified concept. [I mean, in the wake of a strictly non-phenomenological approach as that inaugurated by the construction of the alpha-phoneme, but they have, all the same, come close to a unified mathematics as represented by Norbert Wiener's work, for instance (*Cf.* N. Wiener. A New Theory of Measurement. A Study in the Logic of Mathematics Proc. of the London Mathematical Society. 2nd Series, vol. 19, 1921, pp. 181-205)].

To these workers, I point out a sharp-edged reason—the post-Kantian transcendental logic, the dialectical method of Hegel and the Arthāpatti of the post-Śankara Advaitism, as well as the modern mathematics such as the Symbolic Logic Mathematics and Intuitionism with all their deeper implications. I land thus into a beautiful synthesis. Once the contradiction is removed by the postulation of an entity, we accept even the very contradiction as the natural inevitable Law. This may appear paradoxical. But it is not so. Finally, it may be remembered here that *ad hoc* hypotheses are well known in modern science. For instance, " wave mechanics embraces the old, rather *ad hoc,* quantum conditions of the earlier theory." (WILLIAM WILSON, *The Microphysical World*, Home Study Books. London 1951, pp. 142-43.)

ADDENDUM II

Here I wish further to indicate also how Bhartṛhari's tradition is extended in my work. I am specially indebted to Prof. V. A. Ramaswamy Śastri for many illuminating discussions on Bhartṛhari which indeed have given me an enlightened outlook.

Bhartṛhari himself, to my mind, brought only into greater relief the meta-linguistic ' symbolic ' thinking hidden mostly, for instance, in Pāṇini to the modern eyes. For, in modern times the spirit has degenerated into intellect in the language of C. G. Jung, (C. G. Jung, Psychological Reflections, collected and ed., by J. Jacobi, London, 1953, p. 225).

As an illustration, I take the last sūtra of Pāṇini : *a ə* The open (vivṛta) *a* is taken leave of here and the closed samvṛta) *ə* is re-established, so to say, by this sūtra. In actual usage, the short *ə* is only closed. But to ensure operational efficiency, for pragmatic convenience only, the ' actual ' *ə* is treated as *open* ' *a* ' in the Śāstra. By the ingenious device of the sūtra *purvatrāsiddhaṁ,* this process is explained in Pāṇini's *aṣṭhādhyāyī*. But the implications of the apparently innocent sūtra *a ə* at the very end of this great work are vast and of profound significance. This sūtra is a ' disguised imperative '.

Pāṇini may be interpreted to mean on the basis of this sūtra which he has so significantly placed last in his work, that the whole *Vyākaraṇa Śāstra* is to be treated as a *construction* (*i.e.*, ' as if '). This is indeed attested by a long tradition. Witness Bhartṛhari, for instance, in his *Vākyapadīya* : *Śāstreṣu prakriyābhedaiḥ avidyaivopavarṇyate..........................upāyāḥ śikṣamāṇānām bālānāmapalāpanāḥ asatyevartmani sthitvā tataḥ satyam samīhate.*

Also note the well-known dictum :
Sarve sarvapadādeśā
Dākṣī putrasya Pāṇineḥ.

This leads us particularly to the sphoṭa vāda in the hands of Bhartṛhari. Speaking of it, it appear to me as a very loose analogical way of thinking to equate *vākyasphoṭa* with sentence-reality theory of Otto Jespersen. All thinking in terms of analogy is defective. It betrays a diffidence to think in terms of abstraction and it readily compromises with an over-concretising tendency as crutches. At a higher level, no doubt what to us ordinarily appear as " mere empty abstractions " like even the ' Inconscient ' and the ' Ignorance ' one comes into an actual " collision with " " or (is) plunged into their dark and bottomless reality " and feeling their " concrete powers whose resistance is present everywhere and at all times in its tremendous and boundless mass." (Sri Aurobindo, Letters on " Savitri," Sri Aurobindo Ashram, Pondicherry, 1st edition 1951, p. 9). But at this level no analogy is needed. In fact, here it has no meaning and vanishes completely.

Therefore, let us approach our present problem directly for a fresh evaluation. To my mind, the eight sphoṭas were each *real* in itself, according to Bhartṛhari. Here we meet with the levels of abstractness as in mathematics. For instance, note the transition from affine geometry to *analysis situs* via projective geometry. *Analysis situs* treats of the totality of the properties which remain intact with respect to all continuous one to one transformations. There is no distinction here between a cone, a cube and a pyramid. They are only one structure. For, any one can be changed into the other by a continuous transformation. The sphoṭa is thus one. It is just like the *Rasa* being ' one ' in an *ultimate* sense.

Also, the continuum is not composed of parts. The continuum of the positive numbers, the continuum of the negative numbers and the continuum of the numbers coinciding with zero are each itself. It is not true, however, that the *entire continuum* is composed of all these sub-continua.

There is too an identity of the ' vibration-phenomena ' and the entire ' matter ' :—" *ekasyaivātmanobhedau śabdārthāvapṛthakṣthitau.*"

Here again, there is tradition from Ṛgveda onwards. *Vāk* is referred to therein and there is a distinct reference to *ādya spanda* in tantra literature. It is beside the point, how our ancients conceived of the vibration-phenomena and that, therefore, it may be very different in details of approach between them and the modern scientists.

In the very opening stanza of the vākyapadīya, Bhartṛhari speaks of the transformation of śabdatatva (vibration-phenomena) into *artha*. I translate *artha* here as *matter*. Just as the geographical space and the chronological time are different from the *space-time* continuum in relativity, *artha* as 'meaning' is different from *artha* as 'objective reality,' 'facts' or finally even 'matter.' It would be as ignorant to render *artha* into a uniform sense, as it would be to give a *fixed* meaning to 'space' and 'time' as geographical and chronological respectively. One may remind oneself here that Sri Aurobindo renders *anna* as *matter*, contrary to the usual sense.

In *vācam artho'nudhāvati*, for instance, *vāk* means the free creation of thought and *artha* means 'facts' which run as it were to fit into conceptual relations (propositions). It is in this manner, with characteristic humour, Patañjali in his Mahābhāṣya speaks of *Pratipada pāṭha*. where Indra was concerned as a student and Bṛhaspati the teacher—nāntam jagāma. [I would, therefore, interpret तेच प्रापरुदन्वन्तं बुबुधे चादिपूरुष: :(Raghuvamśa 10th sarga, Verse 6), symbolically as facts falling within a 'field' *i.e.*, a structure implying relations and relations of relations with the simultaneous awakening or self-manifestation of the reality].

"There is no knowledge except through vibration-phenomena" declares Bhartṛhari in his vākyapadiya—

"na so'sti pratyayo loke
yaśśabdānugamādṛte
anuviddhamiva jñānam
sarvam śabdena bhāsate"

The attitude which says "thus far and no farther" is always irritating, in any intellectual enquiry. The true joy, on the other hand, resides in the attempt at unifying different levels of experience.

The jump from the vibration-phenomena (the 'actor') to *time* (the 'stage') is inevitable. For, both are one ultimately. Hence Bhartṛhari speaks of (*Kāla*) *śakti* in the third Kāṇḍa of the Vākyapadīya. In my hand, it is the entry of the *timeless* 'quality' (if it can be called *quality* in an altogether special sense) into time-order.

It is interesting to note here that according to one commentary on the *Vākyapadīya*, *paśyantī* is equated with *pratibhā*. This is very significant. For, *pratibhā* is the *creative level*. It is the interval between any two empirical states. It is so to say the 'interphenomenon—*Yeyam samastha śabdārtha kāraṇabhūtā buddhiḥ yām paśyantītyāhuḥ*. It is perceptible but not measurable. One should not delude oneself by denying this—*na tadapahnavena ātmā vañcanīyaḥ*.

The entry of the 'time-less' into 'time-order' is the basis of all *measurement*. It is the basic 'attention'—[(*Free-will*)—instinct] identity. Bhartṛhari also contrasts *sarvārtharūpatā śuddhiḥ* with *jñānasya upaplavaḥ*.

In my hand, the one is the *direct* 'experience' of continuity while the other is the *intuitive belief* as to the physical, physiological and the psychological continuity.

The former is the alpha-phoneme while the other is the alpha-phonoid. The latter is *related* but an undifferentiated existence. It holds the unmanifested germs of varied and varying differentiation.

It is the [stimulus-(steady-state) response] identity. It is the [instant(aneous)-entity], a conception like the 'matter-wave'. It is also a [(before-after)] identity. It is the *kavisahṛdayākhya* identity—the *sārasvata-tatva.* It is an ultimate datum for science. It is perception through duration. The duration is *sui generis—akhaṇḍa.* The alpha-phonoid is the content of a 'specious present' the Eternal Now. At that 'point', the active future and the passive past are disjoint and the world is not closed in its spatial and temporal dimensions.

"Thus," adopting the language of Hermann Weyl, "the ultimate answer lies beyond all knowledge, in God alone; emanating from Him the light of consciousness, its own origin hidden from it, grasps itself in self-penetration, divided and suspended between subject and object, between meaning and being" (Hermann Weyl *Philosophy of Mathematics and natural Science,* Princeton, 1949, p. 125; *cf.* also *ibid.*, pp. 208-9; especially p. 209—" We are confronted, rather, with the fact that the realm of Being is not closed with respect to its determining factors, but that in the ego, where Meaning and Being are merged in indissoluble union, it is open toward Meaning").

This [timeless-(time-order)] 'quality' is reflected at every *instant* (*i.e.*, a 'point-vibration'). It is resembling more to an infinitesimal segment of a non-Archimedean Order than to the point in ordinary '*linear*' *continuum.*

When I speak of the *timeless,* I am in entire agreement with Dr. C.T. K. Chari. Quite justifiably he proclaims "The objection that to postulate a 'subliminal mind' inaccessible to ordinary observation and having a status vastly different from that of any supposed 'neural mechanisms' is methodologically unsound ought not to carry great weight in a complex branch of investigation like psychical research, where narrowly conceived operationism may stifle the theory building without which new lines of enquiry cannot be chalked out......The serious difficulty about the connexity of events that precognition suggests, which has no parallel in relativity or quantum mechanics, is masked when we speculate 'betweenness' in its purely *spatial* aspect; For intance when we adopt the two-dimensinal theory of time proposed very tentatively by Broad and Price ("Knowlede and Foreknowledge," *Aristotelian Society,* Supplementary volume XVI, pp. 177-245; *cf.* also C. T. K. Chari, On Representations of time as "the Fourth Dimension" and their Metaphysical Inadequacy, *Mind.*, 58, N. S., No. 230, April 1949, p. 220), and say that *y* precedes *z* in the 'familiar time-dimension' and follows *z* in an 'unfamiliar time dimension'

......Psychical phenomena bring with them the possibility that the human self has aspects, prescribing limits to the amount of correlation we can achieve by adopting exclusively scientific methods of investigation and what Carnap called a ' definite language ' (*The Logical Syntax of Language*, Kegan Paul, 1937, Section 17, p. 51) "— C. T. K. Chari, Psychical Research and Philosophy, *The Journal of the Royal Institute of Philosophy in Britain*, 28, No. 104, January 1953, pp. 73-74).

The symbolism of the infinitesimal segment of non-Archimedean geometry presupposes an underlying deep-hidden *reality*, which is " an ordering element, in that it connects series which in themselves are unconnected " (*Cf.* Albert Einstein, Autóbiographical Notes, Philosopher-Scientist, Library of Living Philosophers, ed. by Paul A. Schilpp, Tudor Publ. Co., New York, 1951, p. 7).

In short, in T. S. Eliot's words (*Four Quartets*, 1950, p. 32), I drive at " the point of intersection of the timeless with time " and " every moment being a new and shocking valuation of all we have been " (*ibid.*, p. 18).

My work not only strives to establish correlation between different levels of experience within scientific thought, but it also strives to enrich the very content of our own ancient thought and wisdom, in that it attempts to make alive (*i.e.*, relive) those terms like *artha* which through long usage and due to intellectual apathy, have come to be used later in senses different from those in which they were obviously used originally by men like Bhartṛhari. Intellectual apathy is at the extreme end of a *psychological security*. A direct consequence of this intellectual apathy is the *insincerity* which Bertrand Russell has so rightly remarked with pointed emphasis as one of the main trends of "the most influential school of philosophy in Britain at the present-day " (with whose 'linguistic doctrine ' I share wholly my disagreement along with Bertrand Russell) in his able paper " The Cult of ' Common Usage ' " (The British Journal for the Philosophy of Science, III, February, 1953, 12, pp. 303-7).

A gross misconception of the original connotation of a term used by Śaṅkara due to Faddegon, and thereby perpetrating an indignity to that remarkably great intellectual giant has already been referred to by me, towards the end of my paper, The Concept of Keynote in the Taittirīya Prātiśākhya (JORM, September, 1945, vol. 15, pp. 32-33).

A dictionary of terms, in the true sense, should be an ultimate analysis of the thought-processes these terms were intended to represent. This means going far beyond the superficial meanings, and this can be done only if we fully sympathise with the past experiences of others. Such a deep intellectual sympathy, to say the least, a creative æsthetic response, can come only if we have deep experiences, at any rate, at least at the intellectual (if not, at the supra-rational) levels, ourselves. This alone, I consider, is my humble but distinct contribution to Indian thought as well.

"The mind of man demands," observes Sri Aurobindo (On Translating the Upanishads. Eight Upanishads, Sri Aurobindo Ashram, Pondicherry, 1953, p. XIV), "and the demand is legitimate, that new ideas shall be presented to him in words which convey to him some associations with which he will not feel like a foreigner in a strange country where no one knows his language, nor he theirs. The new must be presented to him in the terms of the old ; new wine must be put to some extent in old bottles."

Logicians and mathematicians have ever been subjecting the rules of their game for investigation at the metalogical and at the metamathematical levels. But I have been striving after a demonstration of a deeper synthesis, born of an unshakeable faith now that any mere exstension of empirical frontiers of knowledge will not do, taking my departure only the basis of my experiences, albeit modestly and moderately intellectual. It remains for various specialists to work out now the different details. My plea is that in the crucible of inner experience alone, the original significations of the terms used by our ancient thinkers can become vivid and full of life. Thus they will be *revivified* with *exuberance—Brāhmaṇaḥ pāṇḍityam nirvidya bālyena tiṣṭhāset* ; *bālyam ca pāṇḍityam ca nirvidyātha Muniḥ* (*Bṛhadāraṇyakopaniṣat*, Ānandāśram Series 15, 3rd Chapter, 5th Brāhmaṇa, 1891, p. 441). "If you survive the ocean of learning, you attain verily to *youthful exuberance* and then you are truly a sage." Remember that in this context *aśeṣaviṣayadṛṣṭitiraskaraṇam* is called strength by Śankara. Note also the gloss of Śankara on *Nirvidya* as *Niśśeṣam Kṛtvā*. Here we are not required to prove anything. For, at such a level, we at least have a glimpse of if not actually touch "a more comprehensive consciousness, a profounder faculty, which for the most part remains potential only so far as regards the life of earth, but from which the consciousness and the faculty of earth-life are mere selections" [Frederic W. H. Myers (ed., and abridged by his son Leopold Hamilton Myers), *Human Personality and its Survival of Bodily Death*, New York and Bombay, Longmans Greens, and Co., 1907, p. 13 ; *Cf.* also B. L. Atreya's presidential address to the Psychology Section—"Modern Western Psychical Research and Ancient Indian Adhyātma Vidyā—Their Meeting Points," *Proc. of the 26th Indian Philos. Congr.*, Poona 1951, p. 62.]

This comprehensive Universal consciousness in the Alpha-phonoid "becomes so present (here to our consciousness) by an act of faith;..............For, as the Upanishad says, we must believe in God before we can know Him ; we must realise Him as the 'He is' before we realise Him in His essential" (*Cf.* Sri Aurobindo, On Translating the Upanishads, *op. cit.*, p. xi).

The alpha-phonoid is, as it were, the power of self-manifestation of the alpha-phoneme, and that is the mother consciousness *Ādya Śakti*, Aditi—consciousness—power (Nolini Kanta Gupta, *The Yoga of Sri Aurobindo*, Part six, Sri Aurobindo Ashram, Pondicherry, 1st edition, 1953, p. 20).

The entire conception is, as it were, a challenge ultimately that "at every minute (moment or 'instant') you have to decide whether you wish to remain within the humanity of yesterday or belong to the superhumanhood of tomorrow" (The Mother, The Four Austerities and The Four Liberations, Sri Aurobindo Ashram, Pondicherry, 1954, p. 7). The former is the 'linear' continuum using the symbolism behind the accurate or precise mathematical thinking of modern times while the latter is the Veronesean continuum.

Here is the man who has successfully solved the problem of his relations with the two worlds of data and symbols. "With regard to the problems of practical life he entertains a series of working hypotheses, which serve his purposes, but are taken no more seriously than any other kind of tool or instrument. With regard to his fellow beings and to the reality in which they are grounded, he has the direct experiences of love and insight......we approach the crisis of our times, not with love and insight, but 'with formulas, with systems'—and pretty poor formulas and systems at that......'our system of upbringing is based upon *what* to think, not on *how* to think" (Aldous Huxley's Foreword to J. Krishnamurthy's The First and the Last Freedom, London, Victor Gollancz, Ltd., 1954, p. 13).

References

1. C. R. Sankaran, *Phonemics of Old Tamil, Deccan College Monograph Series*, No. 7, 1951.
2. ———, A Contribution to Speech-Structure, BDCRI, vol. 12, 1952, pp. 217-4.
3. C. R. Sankaran and P. C. Ganeshundaram, Time and Speech-Structure, BDCRI, vol. 12, 1954, pp. 394-414.
4. E. A. Milne, *Relativity, Gravitation and World-Structure.* Oxford, Clarendon Press, 1935.
5. ———, *Kinematic Relativity*, Oxford, Clarendon Press, 1948.
6. E. T. Whittakar, *From Euclid to Eddington*, Cambridge, 1949.
7. Klein, *Elementary Mathematics from an Advanced Standpoint.* Vol. I and II, English Translation, Dover Publ. 1939.
8. C. T. K. Chari, Is time Metrizable?, *Proc. Ind. Philos. Congr.* 1951, pp. 134 ff.
9. A. A. Robb, *Geometry of Time and Space*, Cambr. 1936.
10. Hilbert, *Foundations of Geometry*, English translation, Illinois, 1947.
11. H. A. C. Dobb, *The British Journal for the Philos .of Science*, 1951, vol. 2, pp. 122-141, 177-192.
12. G. W. Scott Blair, *ibid.*, 1952, vol. 3, No. 9, p. 82-85.

Note.—Throughout this treatment of the subject, I have been guided by two important principles, which I state here in the language of Erwin Schrödinger (*Nature and the Greeks* Cambridge at the University Press 1954, pp. 17 and 20-21 respectively).

(1) "By the serious attempt to put ourselves back into the intellectual situation of the ancient thinkers,......very often much less biased, we may regain from them their freedom of thought—albeit possibly in order to use it, by our superior knowledge of facts, for correcting early mistakes of theirs that may still be baffling us."

(2) "Instead of following the order in time let us be guided by intrinsic connexion of the subjects. This will bring together various thinkers' ideas on the same problem...... It is the ideas we wish to reconstruct here not the separate persons or minds."

REBIRTH AND RELEASE IN THE ADHYĀTMARĀMĀYAṆA[1]

By

H. G. NARAHARI

Concerning the AR. the usual belief is that it is a portion of the *Brahmāṇḍa-purāṇa* ; but, judged by its contents, it must be only a medieval recension of the Rāmāyaṇa of Vālmīki with the theology of later Advaita and the Śākta system tagged on to it.[2] Since the Marāthi poet-saint Eknāth who lived in the 16th century A.D. speaks of it as a recent work, it is possible to look upon it as a fairly late production.[3] The object of this paper is to consider the contribution of the poem to our knowledge of the Hindu theory of Karma and rebirth.

All suffering, the AR. lays down,[4] proceeds from the body which, in its turn, has *Karma* (deeds) for its *raison d'être.* If then the individual suffers, it is because his egoism (*ahaṁkāra*) brings about an unreal identification between his soul (*jīva*) and body (*deha*). The embodied soul then acts and is helplessly held tight by the consequences of its deeds (*jīvaḥ karoti karmāṇi tatphalair badhyate'vaśaḥ*).[5] Accordingly as the actions are virtuous or vicious, the soul moves on upward and downward (*ūrdhvādho bhramate nityaṁ pāpapuṇyātmakas svayaṁ*).[6] The man is deluded enough to think that the gifts (*dāna*) he gave or the sacificers (*yajña*) he performed will lead him to a permanent life of happiness and enjoyment in the world of heaven (*svarga*) above. But, unfortunately, the moment the merit is exhausted his soul finds to its dismay that, with whatever protest, it must return to earth.[7] On this earthward journey the soul is first said to fall into the lunar

1. References to the *Adhyātmarāmāyaṇa* in this paper are to the Nirnayasagara Press edition (VI Edition) of the Poem, Bombay, 1901.

The following abbreviations are used :

AR.	=	Adhyātmarāmāyaṇa
Ātman	=	Ātman in Pre-Upaniṣadic Vedic Literature, Adyar Library, 1944.
Bṛ	=	Bṛhadāraṇyaka
Ch.	=	Chāndogya
HIL	=	*History of Indian Literature*, Vol. I, by M. Winternitz, Trans. by Mrs. Ketkar, Calcutta, 1927.
ORL	=	*Outline of the Religious Literature of India by* J. N. Farquhar, Oxford, 1920.
Up.	=	Upaniṣad.
VSM	=	*Vaiṣṇavism, Śaivism and Minor Religious Systems* by R. G. Bhandarkar (*Grundriss*, Strassburg, 1913).

2. *Cf.* J. N. Farquhar, ORL, p. 250 ; M. Winternitz, HIL, Vol. I, p. 579. It seems to me that, in the earliest stage, the Advaita of Śaṅkara did not know of the theological accretions that grew around it in later times.

3. R. G. Bhandarkar, VSM, p. 48, J. N. Farquhar, *loc. cit.*; M. Winternitz, *loc. cit.*

4. IV. 8.12 ff., p. 241 f.

5. IV. 8.17*a*.

6. IV. 8.17*b*.

7. IV. 8.18-19.

orb (*patitvā maṇḍale cendoḥ*).[8] On this point the AR. is in pointed disagreement with the chief text in the Upaniṣads.[9] There the heaven of the fathers (*pitṛloka*)[10] appears to be known to be situated on a plane lower than the lunar world which is the final destination for all souls moving by the southward course of the sun and in which route the world of the fathers is but an intervening station. But the AR. would make this world the final terminus, the lunar world being only an intermediary station during the return journey to earth. The Upaniṣadic text also makes it clear that enjoyment is in the lunar world, unlike the AR. which speaks of the migration of the descending soul to the lunar orb after its temporary enjoyment earlier in heaven (*svarga*).

The description of the remaining part of the journey of the soul till it gets into the womb is in accord with the Upaniṣadic text. Then follows an account of the life of the soul in the womb till it comes back to earth ; but this is, more or less, a summarized form of what is given on the subject in the *Garbha Upaniṣad*[11] and the *Nirukta*.[12]

The soul which comes out of the womb after a stay there for a period of nine months, is likened to a sinner coming out of hell (*narakāt pātakī yathā*)[13] and to a worm getting out of a festering sore (*pūtivraṇān nipatitaḥ kṛmireṣa ivāparaḥ*).[14]

This entire journey of the soul, up and down, is very painful and disgusting. As the means of release from this plight the Upaniṣadic text suggests meditation with faith (*śraddhā*) or knowledge of the five fires (*pañcāgnividyā*) either of which can lead the aspirant to the world of Brahman from which there is no return. But the AR. suggests a different method of release, of course, quite in keeping with its tenets. It maintains[15] that the truest mode of deliverance from the misery of rebirth consists in the realization of the true nature of the soul and in the relinquishment of all egotic (*ahaṁkāra*) tendencies, of all attachment with the body. The body will remain till the exhaustion of the *Karma* which brought it into being, but the soul must bear it as the snake bears the slough (*dhṛtakañcukasarpavat*) which it has to cast off not long after.[16] Such a detached and intelligent soul taking up the daily worship of Viṣṇu is bound, not only to be free from the shackles of transmigration, but also to achieve the *summum bonum* of mundane existence.[17]

8. IV. 8.20.
9. *Bṛ. Up.* VI. 2.9-15 ; *Ch. Up.*, V. 4.10 ; for. a full account of this see H. G. Narahari, *Ātman*, pp. 88 ff.
10. This is probably what the AR. understands by the heaven (*svarga*) it speaks of.
11. 3 ff.
12. *Pariśiṣta* II ; this is the same as what goes by the name of the *Niruktopaniṣad*. It is printed among the *Unpublished Minor Upanishads* published by the Adyar Library in 1933.
13. IV. 8.39.
14. IV. 8.40.
15. IV. 8.42 ff.
16. IV. 8.46-47.
17. IV. 8.35 ff.

In the AR. we thus find a view which may be regarded as a sort of combination of the old Vedic beliefs with the doctrine of the later Upaniṣads. We read of the upper world of heaven (*svarga*) where the virtuous departed enjoy and of hell (*naraka*), the destination of the wicked, which lies downward. Along with this conception come the many views propounded clearly and unmistakably in the Upaniṣads ; but, even among the Upaniṣads, the poem seems to prefer later texts like the *Garbha* and the *Nirukta* to the earliest text of the *Bṛ. Up.* which suffers even here a few noticeable modifications.

ON *CAKRÁN NÁ* IN THE ṚGVEDA X. 95·12-13.

By

M. A. MEHENDALE

The Ṛgveda X.95 comprises the famous dialogue between the king Purūravas and the nymph Urvaśī. According to the version[1] of the story as preserved in the Śatapatha Brāhmaṇa (11.5.1) the dialogue is said to have occurred near a lake in the Kurukṣetra where the king had come by chance while he was wandering here and there after his separation from Urvaśī. Just at that time Urvaśī had also come there with her female friends and was sporting in the lake in the form of water-birds. Urvaśī recognised Purūravas and let him also recognise her. It is at this point that the dialogue between the two, as given in the present hymn, is supposed to have taken place. Purūravas tries to persuade Urvaśī to come and stay with him again, but she rejects all the approaches made by him. It is only an invisible voice in the end that seems to assure the king of a happy life in the heaven.

In order to understand the setting in which the two verses containing the expression under discussion occur, it would be worthwhile to note here in general the contents of the dialogue between the king and the nymph. Purūravas asks Urvaśī to stay for a while and have a conversation with him, for, the thoughts that remain unexpressed do not give happiness to anyone. Urvaśī replies that this is going to be of no use, as she has left him for ever and has become inaccessible to him like the wind. Purūravas pleads that he himself is not responsible for violating the condition[2] which compelled Urvaśī to desert him; it was a trick played by the Gandharvas. Without entering into any discussion on this point, Urvaśī only reminds the king that she has kept her word. Purūravas now complains that not only Urvaśī but also her friends had at that time disappeared—and why? Urvaśī justifies their action by saying that as she was then expecting a child, her friends had to come away to nurse the baby......The king remembers his enjoyments in the company of Urvaśī who had then disappeared like a lightning; now Urvaśī has given birth to a child—may she live long! Urvaśī says that the child is nothing but the embodiment of the strength of Purūravas; she had told him of this coming event, but he would not believe her. Purūravas now wants to know if the child longs to see his father, shedding tears when he knows about him (verse 12). Urvaśī assures the king that the child does shed tears, and will cry for paternal affection; she would send the child to Purūravas—but the king would

1. For a detailed account of the story as given in the various versions, cf. GELDNER, *Ved. Stud.* I.243-295.

2. The condition was that Urvaśī should not see the king naked. The Gandharvas had manœuvred to show the king to her in this condition with the help of a lightning.

not get her back (verse 13). Having lost all hopes, the king threatens to kill himself—to throw himself before the hungry wolves. Urvaśī implores him to do nothing of the kind; she advises him not to put too much trust in women, and disappears. As the king makes a final appeal to her to return, a heavenly voice intervenes, assuring the king joy in the heaven.

The expression *cakrán ná* first occurs in verse 12. Purūravas, having come to know that a son has been born to him, asks Urvaśī.

kadā̆ sūnúḥ pitáraṁ jātá icchāc cakrán nā̆śru vartayad vijānán |

The Padapāṭha renders it as follows—

kadā̆| sūnúḥ| pitáram| jātáḥ| icchāt| cakrán| ná| áśru| vartayat| vi-jānán|

Geldner translates—" When will the son, who is born, seek his father? Like a crying (child), he will shed tears, when he knows definitely." Sāyaṇa renders it as—" When will the son, born (of you), desire for the father? When, knowing (me as his father), and (*na* = *ca*) crying, will he shed tears?"

The same expression occurs once again, but in a slightly different context, in the following verse. Urvaśī replies to the above question of Purūravas in verse 13 which runs as follows—

práti bravāṇi vartáyate áśru cakrán ná krandad ādhyè śivā̆yai|

The Padapāṭha renders it as follows—

práti| bravāṇi| vartáyate| áśru| cakrán| ná| krandat| ā-dhyè| śivā̆yai|

Geldfer translates—" I shall be glad to reply to him when he sheds tears. Like a crying (child), he will cry for the kind cares (of the mother)."[3] Sāyaṇa's interpretation of the line is as follows—" (Oh Purūravas), I tell you by way of reply—(your son) will shed tears; and (*na* = *ca*) he will weep, shedding tears, when the auspicious occasion, that is longed for, is near at hand."[4]

The general purport of the question and the answer is not difficult to follow. The difficulty, however, lies in the interpretation of the expression *cakrán ná* which occurs in both the verses and which is no doubt intended to express the object of comparison with which the weeping (v. 12) and the crying child (v. 13) of Purūravas is compared. The earlier attempts to explain the form *cakrán* have been mentioned by Oldenberg[5] and rightly rejected by him. Oldenberg himself would like to derive *cakrán* from √*krand* and explain it as a reduplicated root-noun of the type mentioned by Whitney in his *Sanskrit Grammar* § 1147 c. This

3. Geldner himself disapproves of his earlier suggestion (Kommentar, p. 193) to take *na* = 'not' in this verse (but *na* = 'like' in verse 12) and regard that in *a* the crying person is the son, in *b* the father (for his explanation of *cakrán* = 'father', see f.n. 7 below).

4. *ādhye ādhyāte vastuni śivāyai śive kalyāṇe samupasthite sati.*

5. *Noten* II. 308-309.

would give us *cakrád*, like *sasyád* from √*syand*, and not *cakrán*. But this means only going against the Padapāṭha and does not involve any emendation in the Saṁhitāpāṭha; for, in the Saṁhitā *cakrád ná* would give *cakrán ná*.[6] GELDNER, in his new translation of the Ṛgveda, accepts the derivation of *cakrán* from √*krand*,[7] but he would regard it as haplology for *cakradán* as *kánikrat* (Ṛv. 9.63.20) for *kánikradat*. As against this explanation it may be observed that in *cakradán* the accent is on *dá* and hence its loss due to haplology is unlikely; in *kánikradat*, however, the accent is on the first syllable and not on *da*. Sāyaṇa already seem to connect *cakrán* with √*krand* when he explains the text word in verse 12 as *krandamānaḥ*; that he paraphrases the text word in verse 13 by *rudan* show that in both the cases he regards the form to be present participle.

It is obvious that these attempts to explain *cakrán* are not convincing. Apart from the irregularities involved in connecting the form with √*krand*, this derivation remains unsatisfactory also from the point of view of the meaning of the verb, The verb √*krand*, in the Ṛgveda, is primarily restricted to the cries uttered by the animals like a horse or a bull, or to the shrieking sound made by the birds; secondarily it is also applied to the thundering or the rumbling sound of the clouds, winds, or waters, or to the sound of the fire and lightning. It is generally believed that 'a war, or a war army' is called '*krándas*' in the Ṛgveda[8] owing to the human shoutings. This is not improbable, but in view of the overwhelming evidence where √*krand* is applied to the sounds of animals it would be more proper to suppose that *krándas* is used in the above senses on account of the sound raised by the neighing of the horses. It would certainly not be beside the point to think here also of the war-drum, the beating of which must have added to the great tumult. Thus in the Atharvaveda 5.20.9, a war-drum is called *saṁkrándana*. In the same hymn, in verse 7, the verb *abhi* √*krand* is used with it, and it is also used in verse 2, where it is compared to a bull (*ṛṣabhó vāsitā́m iva*), or is itself called a bull (*vṛ́ṣā tvám*). In the Ṛgveda, the verb √*krand* occurs in connection with the

6. In support, OLDENBERG refers to MACDONELL, *Vedic Grammar*, §74 a (p. 67). MACDONELL, however, observes—"A final media before a nasal may become the nasal of its own class. There seems to be no certain instance of this in the Ṛv.; *cakrán ná* (X.95.12.13), however, probably stands for *cakrát ná*, though the Pp. has *cakrán ná*." Thus the sandhi between *cakrád ná* as *cakránná* is not obligatory, though it is possible. Pāṇini (8.4.45) allows similarly option in such cases in the spoken language. cf. *etad murāriḥ* or *etan murāriḥ*.

7. Earlier in his *Ved. Stud.* I.279 (1889), GELDNER had rejected the derivation from √*krand* and regarded *cakrán* as the participle of the redupl. Aor. of a root √*kṛ* (as *vavṛdhántaḥ* 4.2.17) As none of the existing three roots √*kṛ* had similar formation, he proposed to postulate a fourth √*kṛ* which would lie at the basis of the words like *kiri*, *karuṇa*, *kurara* (GELDNER translates here *cakrán* as 'unlucky person'). Some years later in his Kommentar (1909) on p. 193 (and Glossar p. 47 under √*kṛ*) GELDNER proposes to derive it from √*kṛ*, and give it the meaning 'the procreator, the father' (he takes the second pāda in verse 12 to mean 'knowing (the facts) he will cry like his father').

8. 10.38.1; 2.12.8; 6.25.4. In 10.121.6, by *krandasī*, heaven and earth are meant.

deities like Śoma and Indra[9] only when they are compared to a horse or a bull. According to the *Petersburg Wörterbuch* the use of this verb as applied to the crying aloud while weeping is instanced in the Ṛgveda only by the form *krandat* in our verse 13. As will be shown below, even this instance is explained only on the basis of the object to which the crying child is compared thereby showing that √*krand* is not primarily applied to the cries of human beings. The use of √*krand* in the sense 'to weep or lament' is common only in later literature.[10] In such circumstances there is little point in attempting to derive *cakrán* from √*krand* and translate *cakrán nā́śru vartayat* as 'he will shed tears like a crying (child)', (verse 12), or *cakrán ná krandat* as 'he will cry like a crying (child)' (verse 13). Moreover, what more sense is gained if one compares a weeping or a crying child with another crying child? Surely there is nothing gained by saying 'he smiles like a smiling man'. The position is hardly improved when Oldenberg (*Noten* II.309) renders the expression in verse 13 as "May he (the child of Urvaśī) weep like some one who bitterly weeps (?? for a dead person, like a lamenting wife?) as if he could in that way stress his noble longing (for the reunion of his parents)."

In order to arrive at a satisfactory explanation of the expression, it is necessary to remember the following three things which seem to be clear—(*i*) that the weeping (verse 12) and the weeping and crying person (verse 13) is one and the same viz. the child of Purūravas and Urvaśī; (*ii*) that *na* = *iva* in both the verses; (*iii*) and that *cakrán* represents the object of comparison (upamāna) with which once the weeping child (*áśru* √*vart*), and once the crying child (√*krand*) is compared. These facts are sufficiently compelling to lead one to the supposition that there has been some misunderstanding on the part of the author of the Padapāṭha in the interpretation of *cakránná* which has further misled the modern interpreters of the verses. I feel that the author of the Padapāṭha has mistaken the object of comparison *cakráṁ* for *cakrán*. The correct rendering of the Saṁhitā text in the Padapāṭha therefore should have been *cakrám | ná |* and not *cakrán | ná |*. The form and accent of *cakrám* are quite regular and the meaning 'wheel' or 'a bird of that name,' undoubtedly gives a better meaning. Also the sandhi between *cakrám ná* would regularly give *cakránná*[11] in the recited text, though in the manuscripts it is

9. In the Ṛv. 10.103.1, 2 Indra, engaged in war, is no doubt called *saṁkrándana*, but in verse 1 he is compared to a bull (*vṛṣabhó ná bhīmáḥ*), and in verse 2 he is himself called a bull (*vṛ́ṣan*). In 8.100.5 *ácikradan śíśumantaḥ sákhāyaḥ* seems to refer to the Maruts or the horses of Indra. In 10.1.2 it is the Fire which is spoken of as *śíśuḥ ......kánikradat*, and in 10.96.10, *acikradat* primarily goes with the neighing of the horse (9.67.4) with which the charioteer (*hárivān*) is compared.

10. This explains Sāyaṇa's rendering of the text-words in verse 13 as *cakran rudann aśrūṇi vimuñcan | ......krandat......rotsyati |*

11. See Wackernagel, I § 283, b α (p. 333)—final *m* is regularly assimilated to the following *n*. Wackernagel further points out that this change of final *m* to *n* before dentals and *n* has led sometimes to mistakes in the Padapāṭha. So Ṛv. 4.11.6 *yán ni-pāsi* has been analysed in the Padapāṭha as *yát ni-pāsi* instead of *yám ni-pāsi*; in Ṛv. 4.24.6 *ávi-venan tám* has been analysed as *ávi-venan tám* instead of *ávi-venaṁ tám*. Oldenberg, however, expresses himself against this view, cf. *Noten* I.275-276; also cf. Sieg, *Die Sagenstoffe des Ṛgveda*, p. 92, f.n. 4.

customary to show anusvāra for such assimilations. That the manuscripts in our case do not show an anusvāra is explained by the obvious fact that they were misled by the Padapāṭha. So far as the recitation is concerned, however, there would be no difference between the text as printed in these two verses as *cakránná* and at the other four places (Ṛv. 1.155.6; 4.31.4; 5.36.3; 8.6.38) where the printed text shows *cakráṁ ná*.

The first line of verse 12 now means—" When will the son, born (to me), desire for (his) father? Knowing (about his father) he will let the tears roll like a wheel (set into motion)." To this Urvaśī replies in the first line of the following verse—" I assure you (that) he lets the tear roll—he will cry like a (moving) wheel for the kind thoughts (of the father, *i.e.* for the paternal affection)."

When Purūravas compares the weeping child with a rolling wheel he is no doubt thinking of the round tears rolling down on both sides of the cheek and the rolling on of the two round wheels of a chariot. He may have also used the comparison in view of the long continuous action involved in both the cases[12]. When on the other hand, Urvaśī compares the crying child with a wheel, the point of comparison is certainly the sound (√*krand*) made by the wheel in its forward movement. The use of the verb √*krand* with the wheel of a chariot (or of a potter) and its employment as upamāna is already found in the Śatapatha Brāhmaṇa 11.8.1.1. Here it is said—*tad yathā ha vai idaṁ rathacakraṁ vā kaulālacakraṁ vā 'pratiṣṭhitaṁ kranded evaṁ haiveme lokā adhruvā apratiṣṭhitā āsuḥ*| EGGELING translates[13], " Verily, even as this cart-wheel, or a potter's wheel, would creak if not steadied, so, indeed, were these worlds unfirm and unsteadied." The sound made by the moving wheel has so much struck the early Aryan that he has chosen to name the bird cakravāka[14] after it. This bird is noted in later literature for its continuous crying throughout the night.[15] From this point of view it would not be unreasonable to suppose that Urvaśī perhaps meant this bird when she used the word *cakraṁ* as upamāna for the crying child. The expression *yathā......rathacakraṁ...... krandet* cited from the Śat.Br. above makes it fairly certain that in our hymn in

12. So far as the long continuous action is concerned, a potter's wheel is also used as the object of comparison. Thus in the Sāṅkhyakārikā 67, in order to show that the Yogī, even after attaining the perfect knowledge, does not immediately leave the body but continues to hold it for some time on account of the past impressions, he is compared with a potter's wheel which continues to rotate for some time on account of the past momentum, though the work of preparing the pot on it has been finished. Read—

samyag jñānādhigamād dharmādīnām akāraṇaprāptau |
tiṣṭhati saṁskāravaśāc cakrabhramavad dhṛtaśarīraḥ ||

The continuous action of the moving wheel is also suggested by such expressions as *cakravṛddhi* used for the method of taking interest on the interest.

13. The Śatapatha-Brāhmaṇa part V, p. 126. SBE Vol. 44. (Oxford, 1900).

14. The bird is also called simply *cakra*. cf. *kokaś cakraś cakravāko rathāṅgāhvayanāmakaḥ* Amara. 2.5.23; also cf. Medinī (Calcutta edn.) 9.23, and 169.31, Trikāṇḍaśeṣa 3.3.351, and Vaijayantī 26.18. Further compare such of its names as *cakrāhva* or *cakrasāhvaya*, and of the sun *cakrabāndhava* (or *-bandhu* ' friend of the *cakra* birds ') Abhidhānacintāmaṇi 2.96, and of the night *cakrabhedanī* (' separater of the *cakra* birds ') Trikāṇḍaśeṣa 1.4.23.

15. The use of *ā* √*krand* is found with these birds in the Kumārasaṁbhava 5.26—*parasparākrandini cakravākayoḥ puro viyukte mithune kṛpāvatī*.

verse 13 we have to interpret *cakráṇṇá krandat* as *cakráṁ ná krandat.* Evidently the same interpretation has also to be adopted for verse 12, as Urvaśī in her reply has chosen to use the same expressions as those used by the king in his question.

Concerning the proposed interpretation for verse 12, viz. *cakráṁ ná áśru vartayat*, it may further be pointed out that the use of *cakrá* with the verb √*vart* and its employment as upamāna is common throughout the Sanskrit literature.[16] In the Ṛgveda itself we have the following instances where the uses mentioned above are well illustrated.

(1) *abhí na ā́ vavṛtsva cakráṁ ná vṛttám árvataḥ /*
niyúdbhiś carṣaṇīnā́m/ Ṛv. 4.31.4.

" (Oh Indra) turn yourself towards us, like the wheel set into motion towards the horses, with the yoked horses of the people."

(2) *ánu tvā ródasī ubhé cakráṁ ná varty étaśam /*
ánu suvānā́sa índavaḥ/ Ṛv. 8.6.38.

" The two worlds follow you (oh Indra), as the wheel follows Etaśa : (to you) follow the pressed Soma juices."

(3) *catúrbhiḥ sākáṁ navatíṁ ca nā́mabhiś cakráṁ ná vṛttáṁ vyátīr avīvipat /* Ṛv. 1.155.6.

" He (Viṣṇu) set into motion the pair, with four times ninety names, like a wheel set into motion."[17]

(4) *cakráṁ ná vṛttáṁ puruhūta vepate máno bhiyā́ me ámater íd adrivaḥ /* Ṛv. 5.36.3.

" Oh Indra (lit. invited by many), master of the press-stones, my mind shakes. due to fear of ignorance, like the wheel set into motion."[18]

(5) *sákhe sákhāyam abhy ā́ vavṛtsvāśúṁ ná cakráṁ*[19] *ráthyeva ráṁhyāsmábhyaṁ dasma ráṁhyā/* Ṛv. 4.1.3.

16. The close relationship between *cakra* and √*vart* can also be seen from such expressions as *cakravartin* ' a sovereign ruler ' and *cakrāvarta* ' whirling motion,' cf. *cakrāvarto bhramo bhrāntiḥ bhramir ghūrṇiś ca ghūrṇane /* Abhidhānacintāmaṇi 1519. The relationship may further also be observed from the fact that a pot prepared on a potter's wheel is called *cakravṛtta*. cf. *asuryaṁ vā etat pātraṁ yat kulālakṛtaṁ cakravṛttaṁ*, Maitr. Saṁ. 1.8.3.; also cf. Kāṭhaka Saṁ. 6.3.; the same expression occurs with the negative prefix in the form *acakravartā* (fem.) in the Āp. Śr. S. 6.3.7 on which the commentator Rudradatta remarks, ' *vartanaṁ vartaḥ / na cakre vartanaṁ yasyāḥ sā tathoktā na cakrabhramaṇena nirmitety arthaḥ /*

17. The pair referred to is that of the day and the night. The three hundred and sixty names are the names of the days in a year.

18. Here the point of comparison is also the shaking of the wheel in motion.

19. *ná cakráṁ* also occurs in the Ṛv. 2.11.20, but there the object of comparison is not the wheel, but the sun. cf. *ávartayat sū́ryo ná cakráṁ bhinád valáṁ índro áṅgirasvān /* " As the sun his wheel, (so) he (*i.e.* Indra) let (the wheel) roll on. Indra, accompanied by Aṅgiras, broke open Vala." GELDNER suggests the possibility of supplying *námuceḥ śíraḥ* (Ṛv. 5.30.7) as the object of *ávartayat.* Sāyaṇa suplies *vájram*, but also gives an alternative rendering where *ná* = not. I would take *cakráṁ* itself as going with both Sūrya and Indra. For a reference to Indra letting the sun's wheel roll on for Kutsa, cf. Ṛv. 5.29.10.

"Oh friend (*i.e.* Agni) turn yourself towards your friend (Varuṇa) like the speedy wheel, (turn) towards us like the quick (horses) yoked to the chariot, Oh wonder-worker, like the quick (horses)."

In the above translation *āśúm* is taken as an adj. to *cakrám*[20] and *ráthyā* (nom. dual mas.) as 'yoked horses'. GELDNER takes *āśú* in the sense of 'horse' and *ráthyā* (nom. pl. neut.) as 'the chariot-wheels.' He translates—"Oh friend, turn yourself towards the friend (Varuṇa), like the wheel towards the race-horse, like the chariot-wheels in quick journey for us, Oh Master, in quick journey!" But the placing of *ná* makes this construction improbable.

(6) *satrā́ te ánu kṛṣṭáyo víśvā cakréva*[21] *vāvṛtuḥ |*
satrā́ mahā́ asi śrutáḥ|| Ṛv. 4.30.2.

"All people together follow you like the wheels. You are at once famous as the great one."

(7) *samānám árthaṁ caraṇīyámānā cakrám iva navyasy ā́ vavṛtsva |* Ṛv. 3.61.3.

"Hastening towards the common goal, come here rolling, Oh New One (lit. Newer, refers to Uṣas), like the (rolling) wheel."

(8) *ó hi vártante ráthyeva cakrā́nyámanyám úpa tiṣṭhanta rā́yaḥ |* Ṛv. 10.117.5.

"For, (the wealths) roll like the wheels of a chariot. The wealths go to different persons."

(9) *sá sū́ryaḥ páry ūrú várāṁsy éndro vavṛtyād ráthyeva cakrā́ |* Ṛv. 10.89.2.

"This Sūrya (goes) round the wide regions. May Indra roll him herewards like the wheels of a chariot."

In later literature also comparisons with a wheel with the use of the verb √*vart* are often met with. They are especially to be found in the didactic verses like—

cakravat parivartante hy arthāś ca vyasanāni ca|[22]
iti kṛtvā pratīkṣāmi bhartṝṇām udayaṁ punaḥ || Mbh. 4.607.[23]

sukhasyānantaraṁ duḥkhaṁ duḥkhasyānantaraṁ sukham |
sukhaduḥkhe manuṣyāṇāṁ cakravat parivartataḥ || Ind. Sprüche 3264.[24]

20. In that case, however, the use of *cakrá* would be in the masculine.
21. For the use of *cakriyeva* with √*vart*, cf. Ṛv. 1.185.1; also cf. Ṛv. 5.30.8.
22. This is according to the Calcutta edn. The critical edn. reads instead—*anityā kila martyānām arthasiddhir jayājayau |* 4.19.3; also cf. Mbh. 13.2360 (Cal. edn.).
23. Also cf. Ind. Spr. 3261.
24. The same simile is implied in the Meghadūta, 109—*nīcair gacchaty upari ca daśā cakranemikrameṇa |*

The word *cakrá* by itself, without involving any explicit comparison as in the above instances, is also often used with √*vart* since the earliest times—

páñcāre cakré parivártamāne tásminn ā́ tasthur bhúvanāni víśvā / Ṛv. 1.164.13.[25]

" On the wheel (of the year) with five spokes (*i.e.* the five seasons) and which moves round and round have stood all the beings."

ékacakraṁ vartata ékanemi sahásrākṣaraṁ prá puró ní paścā́ / Av. 10.8.7.[26]

" (It), having one wheel, one rim, and a thousand syllables, rolls forward first, down afterwards."

ápa jányaṁ bhayáṁ nuda mā́ cakrā́ ávṛtsata / Maitr. Saṁ. 1.2.9.62.

" Remove the fear relating to the people ; may the wheels (of the enemies) not turn (towards us)."

The same Mantra appears in the Taitt. Br. 3.7.7.14[27] slightly differently—*apa janyaṁ bhayaṁ nuda / apa cakrāṇi vartaya /* on which Sāyaṇa comments—" *he uttarahavirdhāna cakrāṇi parabalāny apavartaya etat loṣṭhavad apagamaya /* ;" and in the Śāṅkh. Śr. S. 5.13.3 (also Kauśī. Br. 9.14) the following Mantra is enjoined for repetition by the Hotṛ priest while the Soma-carts are being moved forward—*apeto janyaṁ bhayam anyajanyaṁ ca vṛtrahan / apacakrā avṛtsata* " Hence (drive forth) the danger which comes from foreign (people) and from others than men, O slayer of Vṛtra. The wheels (of the foes) have wended away." (Caland's Tr.).

It is not necessary to give here many citations from the later literature illustrating this use. It would be sufficient to note the following few ones—

Having described the wheel of sacrifice, Kṛṣṇa remarks in the Gītā 3.16,

evaṁ pravartitaṁ cakraṁ nānuvartayatīha yaḥ /
aghāyur indriyārāmo moghaṁ pārtha sa jīvati //[28]

Similar expressions recur when it comes to the description of the wheel of law. Thus while describing the condition of the Kuru kingdom under the rule of Bhīṣma it is said in the Mahābhārata (1.102.12).[29]

25. Also Av. 9.14.11. For other references from the Ṛv. cf. 1.164.11,14 ; 4.28.2 ; 7.63.2 ; 10.27.19 ; the same idea is expressed slightly differently in Hemacandra's Abhidhānacintāmaṇi—*avasarpiṇyāḥ ṣaḍ arā utsarpiṇyās ta eva viparītāḥ / evaṁ dvādaśabhir arair vivartate kālacakram idam //* ; in the Mbh. 4.47.2—*evaṁ kālavibhāgena kālacakraṁ pravartate /* ; also cf. Mbh. 1.1.38, Rāmāyaṇa (G. Gorresio's edn.) 6.73.33. The simile is made quite explicit in the Suśruta (Calcutta edn.) I. p. 19. lines 20-21—*sa eṣa nimeṣādiyugaparyantaḥ kālaś cakravat parivartamānaḥ kālacakram ucyata ity eke /*.

26. Also cf. Av. 11.6.22.

27. Also Āp. Śr. S. 11.7.2 ; Āśval. Śr. S. 4.4.2 ; Mānava Śr. S. 2.2.2.17.

28. The same idea is expressed in the Yājñavalkyasmṛti 3.123 (Ānandāśrama edn.)—
tasmād annāt punar yajñaḥ punar annaṁ punaḥ kratuḥ /
evam etad anādyantaṁ cakraṁ saṁparivartate //

29. Also cf. the following where *cakraṁ* occurs with √*vart*— Mbh. 1.69.45 (critical edn.) ; 12.13801, 13.4262 (both Cal. edn.) ; Bhāgavata Purāṇa 9.20.32.

sa deśaḥ pararāṣṭrāṇi pratigṛhyābhivardhitaḥ |
bhīṣmeṇa vihitaṁ rāṣṭre dharmacakram avartata ||

When the saṁsāra is thought of as a continuously moving wheel, it is said in the Mahābhārata 11.162. (Cal. edn.)—

evaṁ saṁsāracakrasya parivṛttaṁ vidur budhāḥ |

In one of the aphorisms, the relationship between the master and the servants is described in the terms of the spokes of a wheel and its navel—and even with regard to this wheel the use of √*vart* is not missed—

araiḥ sandhāryate nābhir nābhau cārāḥ pratiṣṭhitāḥ |
svāmisevakayor evaṁvṛtti cakraṁ pravartate || Ind.Spr. 212, Subhāṣita-ratnabhāṇḍāgāra 3.87. Pañcatantra 1.89.

The combination of *cakrá* and √*vart* seems to have been regarded so fixed that occasionally the same verb is also used with the associates of the wheel like *paví*, and as the wheel forms a part of the chariot, it is not uncommon to find √*vart* used with *rátha* itself.

víśvāḥ pinvathaḥ svásarasya dhénā ánu vām ékaḥ pavír ā́ vavarta | Ṛv. 5.62.2.[30]
" You (Mitra and Varuṇa) swell all the cows of the stall (?). Following you rolls hereward the one rim (*i.e.* the wheel = the sun or the year)."

anaśvó jātó anabhīśúr ukthyó ráthas tricakráḥ pári vartate rájaḥ | Ṛv. 4.36.1.[31]
" The chariot, that has appeared without a horse, which is without a rein, which is praiseworthy, goes round the regions with three wheels."

sukhó rátha iva vartatāṁ kṛtyā́ kṛtyākṛ́taṁ púnaḥ | Av. 5.14.5.
" May the witchcraft go back to its maker, like an easy (moving) chariot."

tad yathaikapāt puruṣo yann ekataścakro vā ratho vartamāno bhreṣaṁ nyeti......|
tad yathobhayataḥpāt puruṣo yann ubhayataścakro vā ratho vartamāno na riṣyati ......| Ait. Br. 5.5.8.[32]

" Just as a man with one foot while walking, or a chariot with a wheel on one side while moving, fails...... Just as a man with two feet while walking, or a chariot with wheels on both the sides while moving, does not come to harm...."

All the instances cited above show a constant use of *cakráṁ* with √*vart* since the earlist times, and also its use as upamāna. Hence it would not be going away from the established usage when it is suggested, that in verse 12, the Saṁhitā

30. Also cf. Ṛv. 10.27.6, (10.156.3 *paním* for *pavím*?); 5.31.5.

31. Also cf. Ṛv. 5.55.1. It may further be noted that *suvṛ́t* (and occasionally *trivṛ́t*) is one of the common epithets of a chariot in the Ṛgveda. cf. 1.34.9, 12; 47.2,7; 111.1; 118.2,3; 183.2,3; 2.40.3; 3.58.3; 4.33.8; 86.2; 44.5; 8.85.8; 10.39.1; 70.3; 85.20; 107.11.

32. Similar statement is found in the Chānd. Up. 4.16 as well, where the relation between *cakrá* and √*vart* is made explicit—*sa yathaikapād vrajan ratho vaikena cakreṇa vartamāno riṣyati...... | sa yathobhayapād vrajan ratho vobhābhyāṁ cakrābyāṁ vartamānaḥ pratitiṣṭhati..........|*

text should be interpreted as *cakráṁ ná áśru vartayat.* As already shown above the same interpretation is made more than probable by the parallel use of √*krand* with *cakrá* in the Śatapatha Brāhmaṇa.

It is, however, not difficult to understand why we find the wrong analysis of the Saṁhitā text just in these two verses when comparisons with a wheel were not uncommon in the Ṛgveda. For, from among the nine cases cited above, where *cakrá* is used as an object of comparison, the last four cases show the use of *iva* instead of *ná*, and hence in these cases the possibility of any misunderstanding is altogether excluded. In the 5th instance, *ná* precedes *cakráṁ* (*āśúṁ ná cakráṁ*), and so here also no mistake was likely. In the first four instances where *cakráṁ ná* occurs, it occurs together with *vṛttáṁ* or *varti.* This fact, as well as the context, make it impossible that in these cases *cakráṁ ná* could ever be mistaken for *cakrán ná.* In our present case, however, *vṛttáṁ* is omitted after *ná*; and secondly, the context is that of a weeping child. That is the real ground for the mistake. The use of *krandat* in verse 13 has misled OLDENBERG to observe (*Noten* II.309)—"Mir scheint 13^b unverkennbar auf Anschluss an *krand-* zu deuten: redupliziertes Wzlnom. des Typus Wh. § 1147^c". The way in which OLDENBERG has thought in the 20th century seems to hold a pointer to the way in which the author of the Padapāṭha, at least some centuries before Christ, must have thought about our verses. He too seemingly felt that in the given context *cakrán* should be some form derived from √*krand* and hence he analysed *cakránná* of the Saṁhitā into *cakrán ná,* which really should have been *cakráṁ ná.*

33. GELDNER in his *Ved. Stud.* I.279 draws, and rightly, a different conclusion—"Ableitung von *krand* verbietet die nächste Strophe." His view regarding the meaning of *cakrán* as expressed there is, however, unacceptable.

A NOTE ON THE EPISTEMOLOGICAL SIGNIFICANCE OF THE ALPHA-PHONEME AND THE ALPHA-PHONOID THEORIES

By

C. R. SANKARAN

I note with concern a misunderstanding which has arisen out of my postulating two different measures of *time* viz., the 'acoustical' and the 'articulatory'. I am striving to establish these two scales of times, purely on non-empirical grounds, based on the Alpha-phoneme theory (*Cf.* my Monograph, articles 13 and 14). Thus, in an ultimate sense, I take my departure from the mere empirical attempts (at different levels, though) towards the same end made by scientists like Alexis CARRELL and Lecomte du NOÜY [see my Monograph, p. 36 and footnote 99].

To me, *time* is more primitive than *space*. Here I have made use of both A. A. ROBB and E. A. MILNE as scaffoldings to my own theory. Note that on p. 29 of my Monograph I have unambiguously said " that the time relation and space relation are to be regarded both as relations of one continūum here."

To me, there are two levels of 'primitive' temporal experiences. The one is predominantly *articulatory*. Deeper than this is the predominantly *acoustical*. Therefore, in my theory, there is no transformation of *co-ordinates*; but there is only transformation from one *observer* (operating at the *articulatory* or *auditory* level of the 'primitive' temporal experience) to yet another 'equivalent' *observer* (operating at the *acoustical* level of the 'primitive' temporal experience) [*Cf.* my Monograph, p. 35 and footnote 96].

On p. 32 of my Monograph, there is a subtly *implicit* suggestion in the statement, " in our continūum the relation of magnitudes between the successive elements is disregarded." This suggestion I have tried to make more explicit in diverse ways later. For instance, on pages 242-43 in the BDCRI, vol. 12, I have said, " when I speak of *events*, I start at any rate in the beginning with the concept of change in position of entities of more than molecular magnitude so as to avoid the discussions of the identical nature of such abstractions as atoms and quanta. Each *event* is an 'infinitesimal region' in a space-construct—a 'continuous manifold' in which positional relationships have to be expressed."

But in the last three paras on page 232 here, I have made it clear that, " each *event* is related to another by an 'interval' " and that the analysis of this 'interval' into a time-element and space-element is merely a matter of pure convention, as really, " no physical facts, corresponding to these different ways or conventions," exist. The Dedekind 'cut' here I have also chosen to describe more exactly, as a

" formulation of an indefinable infinite ". Now one can get at my intended meaning, out of a combination of all these various statements. The idea of scientific objective reality is obviously inadequate, when we talk either of an ' interval' *between* the consonant and the vowel in a CV configuration or of an *interval* ' between ' any two ' acoustico-articulatory ' *events*. Note also that on p. 244, I conceive the ' events ' to be *real*. Only the ' interval ' cannot be said to be real (*cf.* also here footnote 19 on p. 404 in BDCRI, vol. 12), in this sense. The obvious implications of this is that *time* can *not* be assimilated to Cantor-Dedekind type of ' continuity " as we take into consideration the ' interval ' too. Now each ' event' constitutes a type of regularity, in a deeper sense of the term, which is *ultimate* and *non-causal*.

This idea fits well with the findings of modern psychology as well, where " many *apparently* uncaused events go on in minds any how " (*Cf.* H. H. PRICE, *Aristotelian Society Supplementary Volume*, Knowledge and Foreknowledge 1937, p. 224).

Now the passage is clear for me. It is inevitable that I have to land into a continūum of higher type than that of Dedekind (see p. 399, BDCRI, vol. 12). The ' interval ' is " an ordering element in that it connects series which in themselves are unconnected," to quote Einstein's words used in a different context, albeit (*Albert Einstein Philosopher-Scientist*, Library of Living Philosophers, Ed. by Paul A. SCHILPP, Tudor Publi. Co., New York, 1951, Autobiographical Notes, p. 7). [*Cf.* also DCMS, 7, 1951, p. 39, the concluding sentence of the first para : " we are thus deviously led on once again to the threshold of the philosophical enquiry concerning the ultimate ' discontinuity ' or ' continuity ' in Nature."]

At every *instant*, (to which notion there is nothing at all corresponding, in the world of sense-data), the Universe is *not* closed in its spatial and temporal dimensions. For, it is disjoint from the active future and the passive past.

Adopting the words of A. N. WHITEHEAD (*Process and Reality*, New York, 1941, p. 247 ; cf. also Paul USHENKO, *Power and Events*, Princeton, 1946, p. 153), the ' interval ' (the alpha-phoneme as I have designated it) is the " primitive experience ' vector feeling ' that is to say, feeling from a beyond which is determinate and pointing to a beyond (the alpha-phonoid) which is to be determined."

The alpha-phonoid is the common origin of *both* the ' primitive ' temporal experiences at the *articulatory* and *acoustical* levels (see BDCRI, vol. 12, p. 221).

In the light of such a conception, even the ' point-events ' reduce themselves to pure intellectual constructs. In other words, the *actor* (the vibration-phenomena) merge into the *stage* (the *time*), *i.e.*, ' instantaneous-entities' (with which we have started) are *really* only *instant-entities*. The *outside* is merely the *inside* ; but the outside as only an ' empirical phenomenon ' ceases to exist now. (For an attempt to construct a radically empirical philosophy of Neutral Monism, see Whately CARINGTON, *Matter, Mind and Meaning*, Methuen, London ; see also *ibid*, the

preface by H. H. PRICE, pp. xi-xx). But, on the contrary, the outside, in this perspective, is only a relation of relations (BDCRI, 12, pp. 231-2; Monograph, p. 31, footnote 81; BDCRI, 12, p. 405). Facts themselves do not yield to scientific knowledge without a conceptual (or even beyond it 'Symbolic') construction (*Cf.* EINSTEIN quoted by me on p. 227, footnote 21*a*, BDCRI, 12; *cf.* also Bertrand RUSSELL, *Introduction to Mathematical Philosophy*, 1919, p. 61; A. S. EDDINGTON, *The Philosophy of Physical Science*. Cambridge at the University Press, 1939, p. 152).

Perhaps, the relation between the 'articulatory' time and the 'acoustic' time is analogous to the transformation in . E.A. MILNE's Kinematic Relativity

$$\tau = t_o log\ (t/t_o) + t_o,$$

where τ is the Newtonian time and t is the 'radioactive' time. According to Milne, t is the fundamental scale and $t = O$, being associated with a point-origin of his uniformly expanding model. This belief, based on physical grounds, leads to the result of the transformation $\tau = -\infty$, as a mathematical consequence (*Cf.* G. J. WHITROW, *The Brit. J. for the Philos. of Science*, vol. V, No. 18, August, 1954, p. 151).

But the exact relation between the two times in my theory has yet to be decided by experimental means only, if at all. At present it is only a postulate purely on *a priori* grounds, for idealized signalling, *i.e.* for the purpose of communication.

I, therefore, eagerly look forward to the linking up of experimental observations with the deductive rationalism. I have already observed that " A new way of defining in positive terms, mathemtically speaking, of vowels and consonants in human speech, particularly in terms of differential equations, as boundary conditions of the unobservable (indistinguishable) *conceptual* limit, is the perspective opened up by the alpha-phoneme theory " [DCMS, 7, 1951, p. 27; cf. also *ibid.*, pp. 27-39; C. R. SANKARAN and P. C. GANESHSUNDARAM, Time and Speech-structure, BDCRI, 12, Nos. 3-4, March 1952, p. 410, footnote 33]. From the indeterminate, we arrive, as it were, at the two-valued logic, even as " when the quasi-Boolean algebra reduces to a two-element Boolean algebra (which is a particular case of the simple quasi-Boolean algebra), we have the ordinary or classical two-valued logic." (R. VAIDYANATHASWAMY, Quasi-Boolean Algebras and many-valued Logics, *Proc., of the Ind. Acad. of Sciences*, vol. VIII, Section A, 1939, p. 170).

The alpha-phonoid is a " punctiform beginning in time," as it were [*Cf.* here, " It has been speculated that creation of the Universe was due to a vehement radioactive explosion, of which the fossil of cosmic rays still bears evidence (LEMAITRE)." Hermann WEYL, *Philosophy of Mathematics and Natural Science*, Princeton, 1949, p. 207. It is useful to remember WEYL's remark (*ibid.*, p. 294) " that one has to appeal to atomic physics in order to explain the inner constitution of the stars and the evolution of the stellar system." The alpha-phonoid, being the

stimulus- (steady state) response identity, will obviously give us a far wide and deep insight. *Cf.* footnote 33 of Time and Speech-structure, p. 410, BDCRI. vol. 12.] (*Cf.* too in this connection, Aldous HUXLEY, *The Perennial Philosophy*, p. 74, quoted also in Sri AUROBINDO. On *Himself and on the Mother*. Sri Aurobindo International University Centre Collection, Sri Aurobindo Ashram, Pondicherry, 1953, p. 138 and footnote 1).

REFERENCES :

1. C. R. SANKARAN, Phonemics of Old Tamil, *Deccan College Monograph Series*, No. 7, 1951.
2. ———, A Contribution to the Study of Speech-Structure, BDCRI, vol. 12, 1952, pp. 217-240.
3. ———, Epistemology and the Alpha-Phonoid Theory, BDCRI, vol. 12, pp. 241-248.
4. ———, A Note on the Epistemological Implications of the Alpha-Phonoid Theory, BDCRI, vol. 12, pp. 246-7.
5. ——— and P. C. GANESHSUNDARAM, Time and Speech-Structure, BDCRI, vol. 12, pp. 394-411.
6. ———, Time and Speech-Structure, Addendum, BDCRI, vol. 12, pp. 412-414.

SOME TECHNICAL ASPECTS OF POTTERY DRAWING

By

S. B. Deo and Z. D. Ansari

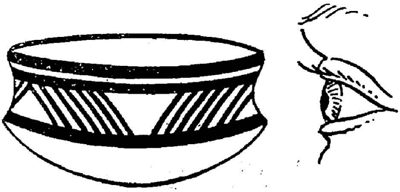
Pottery has rightly been called 'the alphabet of archæology'. To some the statement may appear a bit of exaggeration. But when an archæologist has no other datable evidence like coins etc., he has solely to depend on pottery for his reading of the material culture of the site excavated.

Even with pottery, the archæologist is not in a happy position. For, what he gets is not a set or range of complete pots but generally fragments in thousands. A complete pot is a rarity. So, these fragments are usually the most important bits of evidence for reconstructing the culture of a buried civilisation.

From amongst the heap of potsherds, one has to select only those which are certain portions of a pot, such as rim, base, carination etc., as these indicate with some certainty the probable shape of a pot. On the basis of reconstructed shapes one can judge the standard of the ceramic art of a people of a bygone age.

Such being the importance of these potsherds, their correct drawings involve immense technical care. One is often tempted to fashion the missing parts of a pot according to one's imagination and give either modern or ultra-artistic touches to the pot well over a couple of thousand years in antiquity.

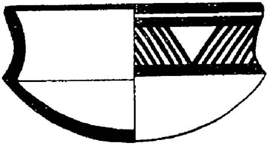
The drawing of potsherds, pots and their shapes, therefore, involves some scientific principles. It is proposed to discuss these in this short article.[1]



1

1. We are grateful to Dr. H. D. Sankalia for giving us guidance in writing out this article.

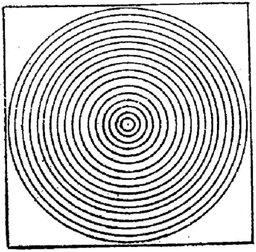
The scientific drawing of a pot as well as a potsherd involves looking at every point of it from the eye-level, and hence, the carination, decorations or the painted lines that run along the circumference of the pot are drawn at right-angles to the line which itself bisects the diameter of the pot. (Fig. 1). All the details (carination, painting, grooves, etc.) of the outer surface of the pot are drawn on the right half of the drawing, and the peculiarities of the inner surface and the thickness or the section are shown on the left half. (Fig. 1*a*).



1 *a*

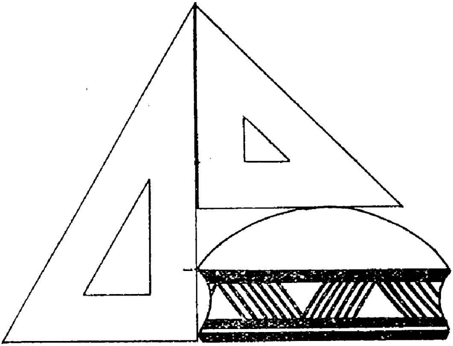
The drawing of pottery is based on the same principles which are used even by the engineers in the drawing of elevation and section of a building. The only difference, however, is that in the former case, the elevation as well as the section of a pot are depicted in one and the same drawing which presents the complete shape and thickness of the same.

To start with, the radius of the mouth of a pot is to be determined. This can easily be done by resorting to the use of a chart showing various magnitudes of radii. For this, a piece of paper of good thickness should be taken. Then from its centre equi-distant and concentric circles should be drawn and their radii from the centre should be specified on the paper. (Fig. 2). When the rim-portion of a pot is placed on the suitable circle, its distance from the centre gives us the radius as well as its circumference.



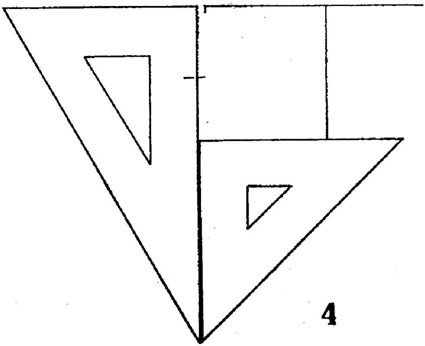
2

The height and the most bulging point of the pot are marked with the help of two set-squares held at right-angles to each other and touching the pot. (Fig. 3).

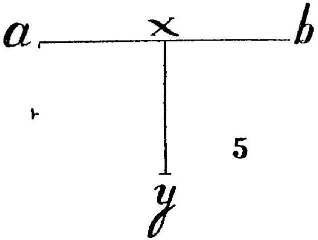


3

These touching points should be marked by means of a pencil on the set-squares. This process gives us three points, *e.g.*, the radius, the bulge-point and the base. (Figs. 4 and 5). Within these limits, we have to complete the shape of the pot.

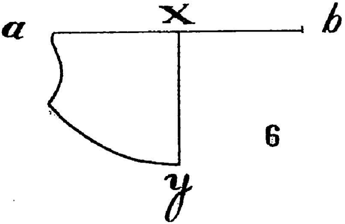


4



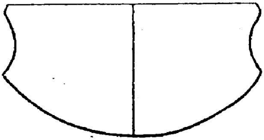
5

(Fig. 6). These points are to be joined with free-hand drawing but taking into



6

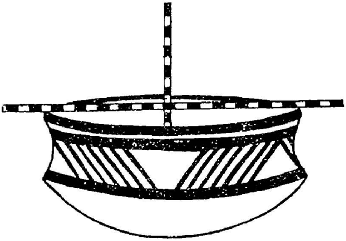
consideration the proper outline of the pot. If necessary, a few more points with the help of the set-squares and divider may be jotted on the outline as it facilitates the minimising of errors in the drawing of the outline. This drawing of the left half should then be transferred to the right with the same radius. (Fig. 7).



7

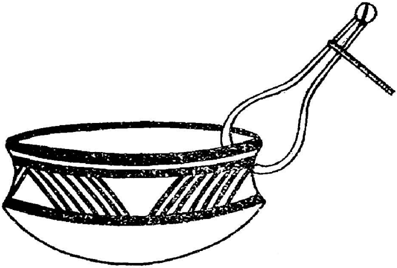
We have, thus, the complete outline of the shape of the pot. Now remains the thickness at the base and at the sides. The former can be judged by means of a pair of scales placed at right-angles over the mouth of the pot. One of the scales sunk vertically into the pot should touch the inner base. We have thus two points, viz., one of the inner base, and the point of the outer base arrived at earlier. The

distance between these two points gives the thickness at the base of the pot. (Fig. 8).



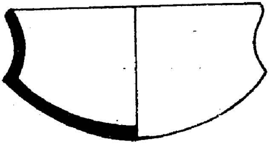
8

The thickness at the walls or sides of the pot can be determined at various points by means of callipers. (Fig. 9). Thus, we can get various points on the



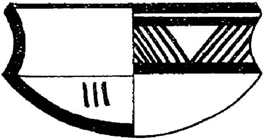
9

outline of the inner surface, which, when joined with the point of the inner base gives us the section or the thickness which is drawn on the left half of the drawing. (Fig. 10).



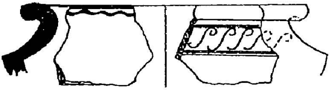
10

Now remain only the decorations like grooves, etc., that are seen either on the inner or the outer surface. These are drawn on the left if they are on the inner surface, and to the right if on the outer surface. (Fig. 11).

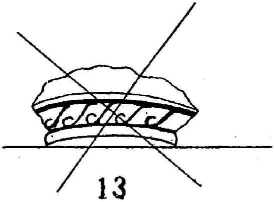


11

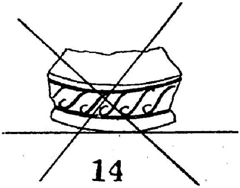
The method employed in the drawing of a pot of which only a rim-fragment is available is more or less the same as described above pertaining to that of the complete pots. (Fig.12). But care is to be taken in finding out the exact diameter of the mouth of the pot. This can be done by placing the rim-fragment on the radii-chart in such a way that the fragmentary rim rests evenly at all points of contact with the arc of a circle of a particular circumference drawn on the radii-chart. Figs. 13 and 14 show the incorrect position while Fig. 15 depicts the correct method of placing the rim-fragment on the radii-chart.



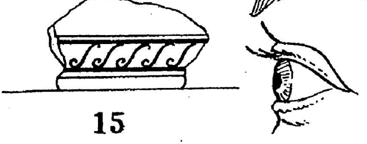
12



13



14



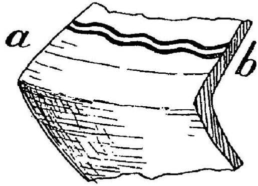
15

But what is to be done in the case of a sherd which does not form part of the rim of a pot? In this case, the method adopted is quite different from those described above. Here, it must be made clear that clues to the drawing of such sherds can be had only in the case of those which are wheel-made.

Every wheel-made potsherd generally reveals faint and close incisions or grooves left over due to the finger-pressure of the potter on the clay while he fashions it. They may also be due to the pressure of tiny silica grains which leave a consistent impression either on the inner or outer surface of a pot turned on a wheel. These are technically called as 'striation marks'. Even when a pot is later on burnished, these marks are faintly visible.

These striation marks are of utmost importance in the drawing of sherds. If the sherd is painted horizontally or forms part of carination, these two aspects along with the striation marks help us in determining the radius and the angle of inclination of that pot at a particular point in relation to its rim.

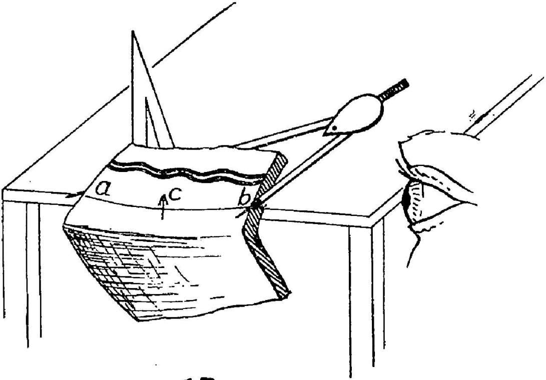
Suppose we have a sherd with striation marks and carination. Out of several striation lines, any one (*a* — *b*) may be selected. (Fig. 16). Then that particular



16

line should be marked with a pointed coloured pencil. Another point (*c*) in the middle of the same line should also be marked. Then, taking a divider the two points of it should be fixed at 'a' and 'b'. Then, both the arms of the divider should be placed on a plane. Keeping the sherd in between the two arms of the divider, the sherd should be adjusted either forwards or backwards so that all the three points,

'a', 'b' and 'c' fall in one and the same line with the eye-level. (Fig. 17). Then the position of the sherd should be noted. This helps in judging the radius as well as



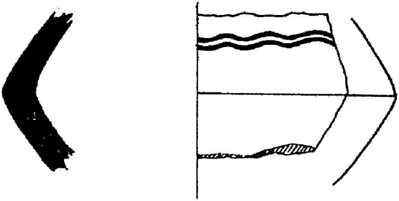
17

the angle of inclination of that particular pot-portion in the form of the sherd from the striation mark. (Fig. 18).

18

By measuring the thickness of the sherd at various points, we can draw its

section. (Fig. 19). Then the outer outline of the section, when transferred to the



19

right, gives us the shape of the pot conforming to the position and probable height of the pot. As usual, the outer characteristics such as painting, incisions etc., should be drawn on the right half of the drawing. If, however, the painting etc., is on the inner surface, then it should be drawn on the left half of the drawing.

The stages involved in the scientific drawing of complete pots, rim fragments and sherds are summarised above. If these are meticulously followed there will not only be conformity in pottery drawing but also correctness and true representation.

A SURVEY OF RURAL HOUSING IN A DECCAN VILLAGE

By

V. M. DANDEKAR

1.1 There are only a few housing studies done in this country and very few of them relate to rural housing. The present one is intended to be a carefully worked out study of rural housing in a village in the Bombay Deccan. Though the results pertain to a single village, it is hoped that they will be found of some value. The principal interest of the study is, however, methodological. In its method, it is perhaps unique in so far as it is based on actual quantitative measurements of the houses and their detailed valuations.

1.2 In the second section is given a brief description of the village Khandali and the lay of its houses. In subsequent sections is presented survey material relating to Public buildings, Non-residential private structures, Unoccupied structures, and Residential houses respectively. In the last section the situation is summarised.

2. *Village Khandali*

2.1 Khandali is a village in Malshiras taluka of Sholapur district in Bombay State. It is situated on the Sangola-Indapur road and is 21 miles from Indapur and $4\frac{1}{2}$ miles from Akluj which is an important marketing centre. The celebrated Pandharpur is only at a distance of 24 miles. The village is served by the Nira Right Bank Canal No. 1 and grows sugarcane as the principal irrigated crop. It is in the vicinity of two sugar mills one at Malinagar and another at Borgaon, both only at a distance of three miles from the village on either side. The rainfall in the area is scanty and the region is liable to frequent draughts and famines.

2.2 The village lands measure nearly 4,400 acres. Of these about 4,035 acres are cultivable and 365 acres are not cultivable. Of the latter, 126 acres are unculturable waste, 128 acres are occupied by the Nira Right Bank Canal which serves the village, 27 acres are under small streams, 26 acres are occupied by railway, 22 acres are reserved as free grazing and 13 acres are under roads and paths. The burial and burning grounds occupy about an acre. The remaining 22 acres comprise what is called the village site in which are situated the bulk of the village houses.

2.3 The population of the village according to 1951 census is 2,023. There are 355 houses and 420 households. At the time of our survey in 1947-48, the houses bore the numbers given at the census in 1941. They numbered from 1 to 509.

Not all of these were situated on the village site mentioned above. Only 292 houses were located in a compact block on the village site. The remaining houses were scattered all over the village lands and were clustered in a number of smaller clusters. Their details are as under :—

In the village site proper	1 to 292
On village land—to the east of village site—scattered	293 to 330
Brihan Maharashtra Sugar Syndicate Farm—labour	331 to 343
Bordering on the village site	344 to 350
On village lands—to the west of village site—scattered	351 to 410
On the farm of Shri Raut	411 to 431
Pawar wadi—in one cluster	432 to 456
Pimpale wadi—in one cluster	457 to 462
Riswadkar Settlement	463 to 477
Scattered all over	477 to 509

2.4 Our survey covered all buildings on the village site and a few lying on its outskirts. The houses located on the village site bore the census numbers from 1 to 292. The few houses lying on its outskirts which we have included in our survey were numbered from 344 to 350. Our survey thus covers 299 census numbered houses. The census house numbers, it should be noted, were those given at the census in 1941. 6 of the numbers from 1 to 292 could not be traced. On enquiry it was understood that they were temporary huts standing at the time of the 1941 census but now no more to be found. As a result, we might say that our survey covered only 293 census numbered houses. On the other hand, some of the structures in the village site which are included in our survey, did not bear any census numbers. There details are given in a subsequent section.

2.5 Even though the census numbering is called house numbering and the number of houses appearing in census handbooks presumably correspond to this numbering, it should be noted that the census house is not in all cases a house in the structural sense of the term. When in a single structure, for instance, more than one separate households stay, a separate number is usually given to each tenement. On the other hand, a census number is given even to non-residential buildings. For clarity in terminology, we shall, therefore, use the term " structures " for structurally independent buildings. Structures will be called residential if one or more families stay in them. A residential structure or a part of it which is occupied by a single household will be called a tenement. A tenement may be either owned or rented.

2.6 In these terms our survey covered a total of 187 structures. As mentioned earlier, some of these bore no census numbers, presumably because these

were in an altogether deteriorated condition and hence unfit either for living or for any other use. We have purposefully included them in our investigation. On the other hand, some of the structures comprised more than one census numbers. In Table 1 we give a distribution of the 187 structures according to the number of census house numbers they bore.

TABLE 1

Distribution of the Structures according to number of census house numbers they bore

Number of census house numbers	Number of structures
0	23
1	91
2	43
3	16
4	9
5	1
6	1
7	3
Total ...	187

Thus 23 structures bore no census number while the remaining 164 structures comprised a total of 293 census house numbers.

2.7 Details of the 23 structures not bearing a census number were as under :— 13 private structures were in an entirely depleted state and stood without any roof on them. 2 public buildings, an old building of the Local Board Primary School and another a community sitting place of the Mangs were in the same state. Two private structures in good condition but not bearing a census number were a cattle shed and a private temple. The remaining 6 structures not bearing a census number were all new and did not exist at the time of the census in 1941.

2.8 In the following sections, we shall describe the physical condition and the use or otherwise of the 187 structures studied by us.

3. *Public Buildings*

3.1 The 187 structures studied by us might be broadly divided into two categories, namely, residential and non-residential. Residential structures are those in which one or more families stay. Among the 187 structures surveyed, 51 were non-residential and 136 were residential. The non-residential structures might be further classified into three categories: (*i*) Public (*ii*) Private non-residential and (*iii*) Private unoccupied. Of the 51 non-residential structures there were 10, 6 and 35 respectively of the three categories. In the present section we shall describe the public buildings.

3.2 The 10 public buildings appearing in our survey were as under :—

1. Village Chawadi
2. Hanuman temple
3. Mahadeo temple
4. Bahiroba temple
5. Mariai temple
6. Local Board Primary School—old building
7. Local Board Primary School—new building
8. Vithoba temple—now converted into a school building
9. Masjid
10. Mang Chawadi.

In the following paragraphs we shall give a description of their present condition, use and management.

3.3 *Village Chawadi* : This, so to say, is the village office and is the place for transacting all official business. It is a rectangular building of 35 × 20 feet dimensions divided into two rooms. The outer room is a hall of 25 × 20 feet and is open on one side. The other room measures 10 × 20 feet and is closed on all sides with entrance door from the hall. The whole building stands on a plinth of dressed stone raised to 2 feet above the ground level. The wall masonry is in dressed stone. The walls are 3 feet wide and 10 feet in height, built of dressed stone in mud. The roof is of mud with ceiling of cut wood and planks. On the front side, the roof is supported on four wooden pillars of 6″ × 6″ dimensions. The door leading to the inner room measures 4 × 2½ feet. Our valuation of the building works to Rs. 3,169.

3.4 The inner room is used to keep the official papers and is locked. The key is with the village Patil. The building is in the care of the village Patil and Talathi (Patwari) who is the revenue clerk. It is regularly smeared with dung by the Koli and swept by the Ramoshi. Both these latter are in the village hereditary service. The building is in good condition and there are no repairing expenses. It is regularly white-washed and painted. The expenses are met through public contribution. In the outside hall is kept a table and a chair for office use.

3.5 *Hanuman temple* : This is a rectangular building with inside measurements of 40 × 22 feet. In one corner there is a closed room of 12 × 6 feet for the priest to live in. 4 feet away from this room is another closed room of 10 × 7 feet which is the inner temple where the deity rests. The rest of the building is an open hall with walls on three sides and open on one side. The whole building stands on a plinth of dressed stone raised to 2½ feet above the ground level. The wall masonary is in dressed stone. The outside walls are 3 feet wide while the inside walls are 2 feet wide. The floor to ceiling height is 10 feet. The roof is terraced. The terrace rests on the backside wall and six wooden pillars in front.

The wooden pillars are of good cut timber and are 6 × 6 inches. The wood used for the ceiling is also of good cut teak. The doors of the inside two rooms are also of fairly good quality timber and can be locked. A staircase from outside leads to terrace. Our valuation of this building comes to Rs. 4,358.

3.6 The priest of this temple is not a local person but an outsider who has apparently no near relatives. He is not a Gurav as one normally is but is a Shimpi by caste. He is appointed the priest and lives in the room provided for. He collects foodgrains or flour in the village by voluntary contribution and cooks his own food. The villagers, by contfibution, also provide for his clothing. He takes care of the temple which includes smearing the floor with dung and sweeping. He, of course, also looks after the deity. In the evening an oil lamp burns near the deity for which villagers make cash contributions. In this village the Maratha families bear three principal family names, Patale and Bhonsale and Kadam. The general care of the Hanuman temple rests with the Patale family while the Bhonsale and the Kadam families take care of the Mahadeo temple. In the Hanuman temple every day regularly at night from 9 to 11 a group of persons sing Bhajan, which is religious songs accompanied by music. The party consists exclusively of members of the Patale families. The party is reputed in the neighbourhood and is often invited outside.

3.7 Celebrations on a considerable scale are held in the Hanuman temple on several occasions such as the birth anniversaries of Ram, Krishna and Hanuman, death anniversary of the saint Sawata Mali, as also on Mahashivaratri and the principal Ekadashies. Celebrations of the birth anniversary of Lord Krishna extend over a whole week. At the end of each celebration, the Bhajan parties are given a feast on behalf of the village. The celebrations are allocated one each to the bigger of the cultivators in the village. They meet the expenses of the respective celebrations.

3.8 The temple is on the road side and is used by travellers as a rest-house for the night. There is no other rest-house in the village.

3.9 *Mahadeo Temple*: This temple is built in the Hemadpanti style and is constructed entirely of stone. The temple stands on a wide plinth raised to five feet above the ground level and of dimensions 77 × 59 feet. The plinth itself is buil: in large dressed stone and is led to by a flight of wide stone steps. The temple stands in the centre of this plinth platform and has approximate dimensions of 35 × 20 feet. The inner temple is of 10 × 10 feet while the outside hall is of 20 × 20 feet. The walls are all of stone and are 3 feet wide. On them and on 8 pillars of dressed stone of 12 × 12 inches rests the all-stone roof. On stone beams of 18 × 18 inches are put stone slabs of 8 inches thickness. One is particularly struck by the big sized stone used in the construction. There are no doors anywhere. Our valuation of the building comes to Rs. 7,994.

3.10 The temple is in the general care of the Bhonsale and Kadam families in the village, though the same priest who looks after the Hanuman temple also takes care of this one. A party from the Bhonsale and Kadam families sing Bhajan every Monday. Birth anniversary of Lord Krishna is the only celebration taking place in this temple. This extends over a week at the end of which the Bhajan parties are given a feast.

3.11 *Bahiroba temple* : This is a small temple of 6 × 6 feet dimensions standing on a plinth of 18 × 18 feet. The construction, including the terraced roof is all stone of irregular size. Our valuation comes to Rs. 1,140. The person who looks after the two temples of Hanuman and Mahadeo also looks after this one. There are no celebrations.

3.12 *Mariai temple* : This is a rectangular building of 40 × 25 feet dimensions, closed on three sides and with a terraced roof of timber and earth-work. The building stands on a plinth raised to 3 feet above the ground level. The wall masonary is of stone in mud. The general condition of the building is good. Our valuation of the building is Rs. 3,659. The temple belongs to the Mahar community and is used by them as a community sitting place. Some of their members also use it for sleeping at night.

3.13 *The Local Board Primary School—Old Building* : The building is at present no longer in use and is now almost in ruins. It was only a single hall of dimensions 30 × 17 feet. The walls on three sides are now not standing and the roof also is not in its place. Only the plinth is in order. Our valuation of the standing structure was Rs. 532.

3.14 *The Local Board Primary School—Present Building* : This is a rectangular building of 37 × 22 feet and consists of a single hall. This was originally the public rest house built by the Local Board. But after the old school building became unusable, the rest-house was reconditioned and converted into the primary school building. It consists of a single hall of 37 × 22 feet with one door of $6\frac{1}{2}$ × 4 feet and 9 windows of $2\frac{1}{2}$ × 3 feet. The door and the windows are of good timber. In the centre of the hall are 7 wooden pillars of 6 × 6 inches and 8 feet in height. On them and on the walls rests the terraced roof of timber and earth-work. The timber used for the ceiling is good. The walls are of good stone and are $2\frac{1}{2}$ feet in width. Our valuation of the building comes to Rs. 3,297.

3.15 The condition of the building was not very satisfactory. The windows were not well fixed in the walls. The floor was not well made and the roof was leaky in many places. The accommodation also was inadequate. Therefore one school class was moved to the Hanuman temple and another to the Vithoba temple.

3.16 The village teacher also acted as the postmaster. A cupboard and a box belonging to the post office was therefore kept in the school building.

3.17 *Vithoba temple* : This was a rectangular building consisting of a single hall of 43 × 25 feet, closed on three sides. Though originally a temple, there was, at the time of our survey, no deity in it and the building was being used for one of the classes of the primary school. The building was subsequently acquired by the Local Board and was reconditioned for the primary school. As the windows had to be fixed into the walls, and as the old walls and the roof was not in very good condition, the entire building was pulled down to the plinth level. It has since then been rebuilt partly using the old material. It now consists of two rooms and is being used for the primary school. Approximate valuation of the new building comes to Rs. 4,300. The building expenses were all met by the Local Board.

3.18 *Masjid* : This is a rectangular building closed on three sides with 3 feet wide walls of big sized dressed stone in mud and a terraced roof of timber and earth-work. It consists of a single hall of 30 × 22 feet dimensions. The building stands on a plinth raised to 5 feet above the ground level. The height from floor to ceiling is 20 feet. At one end is a platform 4 feet wide and raised to 5 feet above the floor. Our valuation of the building comes to Rs. 3,638.

3.19 The building belongs to the Muslim community of the village. But there are only 8 Muslim families in the village and hence the upkeep and maintenance of the building is not well attended to. One person offers Namaj every morning and evening. He also sweeps and keeps the place clean.

3.20 *Mang Chawadi* : This is a community place of the Mang community. The Mangs are a depressed class community and are one of the poorest in the village. As will appear in subsequent discussion almost the entire community lives in huts of straw and bamboo. The community therefore tried by collective effort to put up a community building but due to poverty of the people, the building could never be completed. The dimensions of the intended hall were 30 × 20 feet. The masonary is more or less complete with plinth raised to 2½ feet and walls on three sides raised to 8 feet height. The walls are in stone and are 2½ feet wide. The community however could never put on the roof and hence the structure remained incomplete. Our valuation of the standing structure is Rs.372.

3.21 In addition to the public buildings described above which were actually covered by our survey, there are, of course, a few more. They are mostly temples and as they are situated away from the village site, we did not include them in our investigation. We should, nevertheless, mention the temple of Kashivishweshwar. This is a big-sized temple comparable with the Mahadeo temple we have earlier described and is also built in the same style. Kashiveshweshwar is the presiding deity of the village and until recently two-day celebrations in the month of Chaitra used to be held in the honour of the deity. There used to be on that occasion a well attended fair. But on account of certain factions in the village reportedly arising out of the management of the funds of the temple, the celebrations are not holding for the last few years. The temple is now totally neglected

and as it is situated rather far away from the village site, there is not even an oil lamp burning at night.

3.22 We should note incidentally that the total valuation of the ten public buildings covered by our survey comes to about Rs. 32,500.

4. *Non-residential Private Structures*

4.1 As mentioned earlier, among the 187 structures covered by our survey, there were 6 private structures being used for non-residential purposes. They were as under : A private temple, a grocer's shop, a workshop of a black-smith, two cattle sheds and one shed for sheep and goat.

4.2 The private temple belongs to a Gosavi who stays in another house in the village. The temple measures 17 × 9 feet, is closed and is not in any use. Our valuation of the building came to Rs. 608.

4.3 The grocer's shop belongs to a Gujar. It consists of three adjoining rooms of 30 × 25, 30 × 15 and 30 × 15 feet dimensions. The first room comprises the shop while the latter two rooms serve as store rooms. At the back of these rooms is a narrow hall of 60 × 10 feet which is partly used for private use. The owner has, however, another house in the village, where he lives. Our valuation of the building came to Rs. 10,981.

4.4 There is yet another shop in the village belonging to another Gujar. The two shop-keepers are related and are actually brothers-in-law. The second shop, however, has no separate building and is accommodated in a part of the residential building. It, nevertheless, occupies about 500 square feet of living area. There are no other shops in the village.

4.5 The workshop of the blacksmith is a tin shed of 15 × 12 feet. The shed adjoins a small ordinary structure of the same dimensions which is partly used as a kitchen. The owner, however, lives in another house in the village. Near his workshop and the room which he uses as a kitchen, the owner also owns a small private temple of 10 × 10 feet and he had recently started constructing a two-room tenement with overall dimension of about 12 × 40 feet which would connect the temple with the kitchen room. The total value of all structures as they stood was Rs. 1,510.

4.6 There is yet another blacksmith in the village but he had no separate workshop. He worked in a part of the residential house and occupied about 120 square feet of it for his workshop. There were three carpenters in the village ; but all of them worked in open grounds under trees near their houses. There were three coblers in the village and all of them worked in the front verandahs of their houses. There were two barbers but they usually worked in the open. During rainy season they worked in the front verandahs of their customers. There

were two washermen and they too worked in their houses. There was one earthen pot-maker and had his establishment in the open ground. There were 23 Mang families engaged in rope-making but they all worked in the open ground near their colony. Thus practically no artisans had any separate establishment as a work-place.

4.7 There were two cattle sheds. One of them was a shed of 25 × 12 feet and our valuation of it was merely Rs. 132. Another was a house in disuse with overall dimensions of about 50 × 75 feet but with no roof on it. The walls too were in a bad condition. Our valuation of the structure was only Rs. 375. In both cases the owners lived in separate houses in the village. The shed for sheep and goat was of bamboo and straw and measured only 10 × 10 feet. Our valuation was Rs. 110.

4.8 As we shall describe in later sections, there were 102 residential buildings, other than huts, in the village. Families staying in 50 of these had no animals or in a few cases if they had one, they were kept in the open ground or under a tree. Families staying in 24 houses had cattle sheds on their farms. Families staying in two other houses had separate cattle sheds in the village. These were described above. In the remaining 26 cases the cattle stood in a part of the residential houses. In 9 of these cases, the cattle stood in the open courtyard of the houses without any shed while in 17 cases the cattle sheds were actually combined with the residential houses. Few of those staying in huts had any cattle and in all such cases, the cattle stood in the open.

4.9 To sum up, it might be pointed out that there were practically no structures which could be classified as wholly non-residential. The grocer's shop and the blacksmith's workshop, though in both cases the owners lived in separate houses in the village, were both used partly as kitchen or for other private use. One of the two cattle sheds was no more than a house in disuse and was without a roof.

5. *Unoccupied Structures*

5.1 There were 35 unoccupied structures one of which was yet under construction. The remaining 34 might be broadly classified into three condition classes as habitable, repairable and in ruins. In Table 2 we give a classification of the unoccupied structures into these classes showing for each class their area and value. For structures in the last two classes, the area has been divided and shown separately as "under roof" and "not under roof."

TABLE 2

Distribution of the Unoccupied Structures according to condition

Condition	No. of structures	Area under roof sq. ft.	Area not under roof sq. ft.	Value Rs.
Habitable	9	5590	—	20401
Repairable	6	1725	1136	7039
In ruins	19	420	19290	5727
Total ...	34	7735	20426	33227

5.2 The basis of the valuation given in the last column and the rates used in valuation are given in a subsequent section. Briefly it might be noted that the quantities of various structural items such as foundation, masonary, doors, roof, etc. were worked out in each case by actual measurement. These were then valued at building rates prevalent in the neighbourhood. It should be clearly understood that the values are not the market values of the structures as they stand, nor the building costs at the time they were built. They are the present costs of building a structure of similar specifications in quantities of various items as they actually appear to-day. Thus the valuation is at present the building cost; it takes into account the quantitative depreciation in various structural items, but takes no account of the depreciation in quality or condition.

5.3 Of the 9 habitable structures, 5 were A class structures, one was a B class and two were C class structures and the remaining one was a hut of straw and bamboo. Descriptive details of this classification are given in a subsequent section. Considering the 9 habitable structures together, their value will be seen to work at about Rs. 3½ per sq. foot of area. On this basis the value of the 6 structures which were repairable would work out to be about Rs. 10,000 while their present value was about Rs. 7,000. The difference of Rs. 3,000 indicates the extent of quantitative deterioration of these structures and might be considered approximately the cost at which they could be made tolerably habitable. This of course presumes that all that was standing was useful and that there would be no need to dismantle and rework any part of it. This appeared to us largely true and in most cases the repairs consisted of putting on a roof on the uncovered area. On the other hand the structures in the next class were in total ruins and practically beyond repairs. On the basis of Rs. 3½ per sq. foot of area their value would be about Rs. 69,000 while their value in their present state was only Rs. 5,727 which meant that even less than 10 per cent of their original quantities were now standing on the ground.

5.4 The unoccupied structures might be classified according to the whereabouts of their owners. Considering first the 9 habitable structures, in 5 cases their owners lived in other houses of their own in the same village. In 2 cases the owners were living in farm-houses of their own while in the two remaining cases the owners were not living in the village. As to the whereabouts, of the owners of the 6 repairable structures, in two cases they lived in other houses in the village; in two other cases they lived in farm-houses and in the remaining two cases they did not live in the village. Of the 19 structures in ruins, owners of 8 lived in other houses in the village, owners of 4 lived in farm-houses and of 7 did not live in the village. Barring a few exceptions, most of the unoccupied houses were in undivided ownership. It is not, therefore, on account of subdivisions that they were either not occupied or were left uncared for and allowed to become inhabitable.

6. *Residential Houses*

6.1 We shall now describe the residential houses. There were in all 136 residential structures. We have classified them into four broad structural classes as follows :—

Class A : This comprises three separate types originally distinguished by our investigator as under :—(*i*) Solid structure—wide footing and walls of large dressed stone in mud with cement pointing. Roof of cut timber of good quality and iron sheets in good condition. (*ii*) Sound structure—wide footings and walls of rubble in mud. Roof of fairly good timber and in good condition. (*iii*) Medium structure—walls of rubble in mud. Roof of ordinary wood but in good condition.

Class B : Old structure with rubble walls and roof in depleted but yet habitable condition.

Class C : Old structure with rubble walls in good condition but without the original roof, made habitable by means of only a temporary roof.

Huts : Made of bamboo and straw in the main and of little permanent structural value.

In Table 3 we give a classification of the residential structures according to these classes, showing for each class the number of families staying in them, the total area of the houses and their value. We shall first describe only the houses in the first three classes and later describe the huts.

6.2 The residential houses might be classified by the type of their ground plan. There were five easily distinguishable types of ground plan. In Table 4 we give a classification of the houses according to these types.

TABLE 3

Classification of residential houses according to structural classes

Structural class	Number of houses	Number of families	Area sq. ft.	Value Rs.
A	24	51	28,980	1,25,700
B	38	56	24,200	78,314
C	40	63	20,052	69,423
Huts	34	46	10,154	10,666
Total ...	136	216	83,386	2,84,103

TABLE 4

Classification of residential houses in classes A, B, and C according to their ground plan

Type of ground plan	Number of houses			
	Class A	Class B	Class C	Total
Rectangular (solid)	7	17	19	43
Rectangular (hollow)	6	2	2	10
L-shaped	7	12	8	27
U-shaped	1	—	2	3
Rectangular compound with small separate structures within	2	4	6	12
Other types	1	3	3	7
	24	38	40	102

6.3 In earlier sections we have mentioned the valuations of the structures surveyed by us. As we have earlier explained, by valuation is meant "the present costs of building a structure of similar specifications in quantities of various items as they actually appear to-day." In the following we give the detailed rates at which different items were valued.

1. *Foundation* (Excavation and refilling) :
   - (*a*) Good stone in mud ... ... Rs. 22/- per 100 cft.
   - (*b*) Ordinary stone in mud ... ... Rs. 15/- per 100 cft.
2. *Terrace* (raised plinth) :
   - (*a*) Good and cut stone in mud ... ... Rs. 75/- per 100 cft.
   - (*b*) Good and face cut stone in mud ... ... Rs. 40/- per 100 cft.
   - (*c*) Ordinary uncut stone in mud ... ... Rs. 35/- per 100 cft.
3. *Walls* :
   - (*a*) Good stone in mud ... ... Rs. 16/8 per 100 cft.
   - (*b*) Rubble stone in mud ... ... Rs. 13/8 per 100 cft.
4. *Roof* (earthen terrace) :
   - (*i*) Wood-work
     - (*a*) Raw wood ... ... Rs. 110/- per 100 sq. ft. of covered area
     - (*b*) Ordinary wood ... ... Rs. 190/- ,, ,,
     - (*c*) Good wood with joints and beams cut ... Rs. 235/- ,, ,,
     - (*d*) Good wood with all parts cut ... ... Rs. 285/- ,, ,,
   - (*ii*) Earth-work
     - (*a*) Ordinary mud ... ... Rs. 17/- per 100 cft.
     - (*b*) Good mud ... ... Rs. 27/- per 100 cft.

5. *Iron sheet roof*

Normal cover ... ... Rs. 60/- per 100 sq. ft.

6. *Straw roof*:

(*a*) Good straw tied with good bamboos ... Rs. 40/- per 100 sq. ft.

(*b*) Ordinary straw with any support ... ... Rs. 25/- per 100 sq. ft.

These were the current rates for new work. The valuation at these rates, therefore, does not give either the building costs when the structures were built or their present values. It gives the value of building new structures of similar specifications. As we have earlier noted it takes into account the quantitative depreciation in various structural items, but takes no account of the depreciation in quality or condition.

6.4 In Table 5 we give a classification of the residential houses according to their valuation on the above basis.

TABLE 5

Classification of residential houses in classes A, B, and C according to their valuation

Valuation Rs.	Number of houses: Class A	Class B	Class C	Total
101 to 500	—	1	8	9
501 to 1000	1	8	6	15
1001 to 2000	4	12	15	31
2001 to 3000	3	9	2	14
3001 to 4000	3	6	4	13
4001 to 5000	3	1	2	6
5001 to 10000	8	1	3	12
Above 10000	2	—	—	2
Total ...	24	38	40	102

6.5 A number of these houses were partitioned between two or more joint owners. In Table 6 we give their classification according to the number of ownership divisions into which they were partitioned.

TABLE 6

Classification of residential houses in classes A, B and C according to number of ownership partitions

Number of partitions	Number of houses: Class A	Class B	Class C	Total
1	12	26	19	57
2	4	8	10	22
3	5	1	7	13
4	1	2	3	6
5	1	—	1	2
6	—	1	—	1
7	1	—	—	1
Total number of houses ...	24	38	40	102
Total number of partitions ...	51	59	77	187

Thus it will be observed that the 102 residential houses were partitioned into 187 ownership divisions.

6.6 Not all the owners however lived in their respective houses. In Table 7 we give a classification of the houses according to the owner occupants.

TABLE 7

Classification of the residential houses in classes A, B and C according to number of owner occupants

Number of owner occupants	Number of houses			
	Class A	Class B	Class C	Total
0	3	4	2	9
1	10	25	25	60
2	6	6	8	20
3	4	3	4	11
4	—	—	—	—
5	—	—	1	1
6	1	—	—	1
Total number of houses ...	24	38	40	102
Total number of owner occupants	40	46	58	144

Thus while the 102 houses were divided into a total of 187 ownership divisions, only 144 owner-occupants lived in their respective houses. The balance of 43 ownership divisions were not thus owner-occupied. In such cases, either the tenements were rented out or were left vacant. In Table 8 we give details of these cases. It will be seen that 25 out of a total of 187 tenements were actually vacant. 7 out of these, all belonging to class C, were in fact not in a habitable condition.

6.7 As pointed out above, 18 tenements not occupied by their respective owners were rented out. In them lived a total of 21 families. In addition, 5

TABLE 8

Disposal of tenements not occupied by owners

	Class A	Class B	Class C	Total
Owner living elsewhere in the village-tenement vacant ...	3	4	8	15
Owner not in the village-tenement vacant	2	1	7	10
Rented out	6	8	4	18
Total ...	11	13	19	43

owner-occupants shared their tenements with tenants. Thus in all, there were 26 tenants. In Table 9 we give these details for different classes of houses.

TABLE 9

Details of tenant-occupants in residential houses of classes A, B and C

	Number of tenant-occupants			
	Class A	Class B	Class C	Total
Staying in the absence of the owner	8	9	4	21
Staying alongside with the owner	3	1	1	5
Total ...	11	10	5	26

6.8 Thus there lived in all a total of 170 families in the 102 residential houses. Of these 144 were owner-occupants while 26 were tenants. In Table 10, we give a distribution of the houses according to the number of families staying in them.

TABLE 10

Classification of the residential houses in classes A, B and C according to the number of families living in them

Number of families	Number of houses			
	Class A	Class B	Class C	Total
1	10	26	25	61
2	7	8	9	24
3	4	3	5	12
4	1	—	—	1
5	1	1	1	3
6	1	—	—	1
Total number of houses ...	24	38	40	102
Total number of families ...	51	56	63	170

6.9 In Table 11 we give a classification of the resident families by the number of rooms in their use. It should be noted that in the category of rooms we have also included *varandhas* closed only on three or sometimes even on two sides. It will be seen that one-third of the families were living in only one-room tenements and 75 per cent were living in either one-room or two-room tenements.

TABLE 11

Classification of the families resident in houses of classes A, B and C according to the number of rooms in use

Number of rooms	Number of families resident in houses of			
	Class A	Class B	Class C	Total
1	10	15	33	58
2	25	27	19	71
3	7	6	10	23
4	6	6	1	13
5	2	2	—	4
6	1	—	—	1
Total ...	51	56	63	170

6.10 In Table 12 we give a classification of the resident families by living area in their use per person of their members.

TABLE 12

Classification of the families resident in residential houses of classes A, B and C according to the living area per person

Per person living area sq. ft.	Number of persons resident in houses of			
	Class A	Class B	Class C	Total
Upto 25	1	3	9	13
26 to 50	8	15	22	45
51 to 75	15	7	13	35
76 to 100	15	7	11	33
101 to 150	5	16	5	26
151 to 200	5	3	3	11
More than 200	2	5	—	7
Total ...	51	56	63	170

6.11 A classification by castes of families in different classes of houses might be of interest. This is shown in Table 13.

TABLE 13

Classification of families by caste living in different classes of houses

Caste	Number of families living in houses of			
	Class A	Class B	Class C	Total
Marathi	36	26	30	92
Brahmin	1	—	—	1
Gujar	2	—	—	2
Sonar	1	—	—	1
Parit	2	—	—	2
Mali	1	6	1	8
Dhor	4	7	—	11
Musalman	3	3	5	11
Nhavi	—	2	—	2
Vani	—	1	—	1
Vadar	—	1	—	1
Koli	—	3	1	4
Lohar	—	1	1	2
Gosavi	—	2	2	4
Chambhar	1	—	4	5
Mahar	—	4	10	14
Kumbhar	—	—	1	1
Dhangar	—	—	3	3
Ramoshi	—	—	3	3
Mang	—	—	2	2
	51	56	63	170

The social gradation of the castes is clearly apparent in the categories of houses in which they reside.

6.12 Usually when two or more families lived in the same house they belonged to the same caste. There were a few exceptions. Thus there were cases of a Maratha and a Musalman, a Gujar and a Brahmin, a Parit and a Sonar and a Parit and a Mali living together in Class A houses. There were cases of a Maratha and a Musalman, a Maratha and a Mali and a Nhavi and a Gosavi staying together in Class B houses. There were two more cases of a Maratha and a Musalman and a case of Kumbhar and a Koli living together in class C houses. Thus it will be observed that it was quite common for a Musalman to stay with a Maratha in the same house.

6.13 Of the 26 families living in rented houses only 11 families were paying any rent. The remaining 15 were staying free of rent. InTable 14 we give a few details of those who were paying rents.

TABLE 14

Class of houses	No. of families	Total annual rent	Area occupied sq. ft.	Annual rent per 100 sq. foot	Valuation of the rented part	Annual rent per Rs. 100 of valuation
		Rs.		Rs.	Rs.	Rs.
A	6	144	2925	4.92	12,598	1.14
B	3	60	1060	5.66	3,532	1.70
C	2	48	910	5.27	4,633	1.04
Total ...	11	252	4895	5.15	20,763	1.21

It will thus appear that we might take the annual rental value of the houses to be about Rs. 5 per 100 sq. ft. of room area. This works out at about 1·25 per cent of the valuation of the houses.

6.14 We shall now describe the last category of residential structures, namely, huts. As earlier mentioned, there were in all 34 huts and in them stayed 46 families. These huts varied in their structural design and value. Their average value per square foot of area was, however, no more than Re. 1/-. In the following, we give a brief description of a well built-hut.

6.15 On all four sides of the hut is raised to 3 or 4 feet a stone and mud wall of about 2½ feet width. The stones are usually of irregular shape and size and sometimes are kept one on top of another without any mud binding. It is only afterwards that the rubble wall is plastered with mud and dung. In the centre are put three poles on which rests a beam. This beam and the surrounding walls support the roof made of straw. The straw roof is usually of 9 inches thick and is tied by coir to the perlins. There is usually no proper door. Only an entrance of 2½ to 3 feet width serves the purpose. When all family members go out or at night, this entrance is covered by a shutter of straw and bamboo. The kitchen hearth is placed in the centre. At night a bare oil lamp burns on the kitchen hearth. A wooden box with a locker secures the better clothing and other valuables. During monsoon all members sleep inside the hut. Otherwise, the men usually sleep outside either on country cots or on the ground. Firewood is stored outside the hut.

6.16 In Table 15 we give a classification of the huts according to their area per inmate and show for each class, the number of families staying in them, their total area and their total cost. Thus out of the 46 families living in huts, 34 families lived in huts with area less than 50 sq. ft. per person.

6.17 Among the 46 families, 32 were Mang, 10 were Ramoshi, 2 Vadar, one Maratha and one Mahar. It is thus clear that the Mangs are the one community living in the poorest of housing.

TABLE 15

Classification of huts according to the area per inmate

Area per inmate sq. ft.	No. of huts	No. of families	Total area sq. ft.	Total value Rs.
11 to 20	3	3	350	335
21 to 30	5	8	1125	1110
31 to 40	10	13	2844	1321
41 to 50	7	10	2330	2717
51 to 75	5	7	1640	1548
76 to 100	2	3	1100	1044
Above 100	2	2	765	701
Total ...	34	46	10,154	10,666

7. *Summary*

7.1 We might now bring together the above details in a summary table. In Table 16 we give the total real estate of the village in residential and other buildings.

TABLE 16

Summary of real estate in residential and other buildings

	Area under roof in sq. ft.	Valuation Rs.
Public buildings	5,240	32,459
Non-residential structures	2,463	19,116
Unoccupied structures	7,735	33,227
Residential houses	83,386	284,103
Total ...	98,844	368,905

Thus there were nearly 100,000 sq. ft. of area under roof with a total value amounting to nearly Rs. 375,000. About 8 per cent of this area was unoccupied. Further, as we have earlier noted, 25 out of a total of 187 tenements in the residential houses were vacant. In other words about 13 per cent of the available residential accommodation was not being utilised. However, more than the non-use of the available living space, what strikes most the eye of a city visitor to this village, as to many other villages, is the extremely depleted condition of most of

the houses as also the heaps of ruin that lie all around the place. If the available space under the roof could be made available at a small charge, it might be possible to give relief to a number of poorer families at present living in huts and improvised houses. Most of those, living in huts are, however, socially disabled and the caste system would probably prevent them from sharing accommodation with the higher classes. Some expenditure on reconditioning or replacing the roof would also make a number of habitable places truly habitable. These are necessarily short-term measures but will, nevertheless give opportunity for thinking out the problem and assisting in evolving co-operative efforts in this field.

7.2 It was noted in the beginning that the survey included 6 new houses which were not existing at the time of the 1941 census. 3 of these were no more than temporary huts with a total area of 350 sq. ft. and valued at Rs. 320. The remaining three were newly built houses with a total area of 1,246 sq. ft. and valued at Rs. 3,828. Leaving aside the public buildings, the private buildings of all types add to a total of about Rs. 350,000. The value of new buildings since 1941 to 1947-48, that is within a period of about 7 years is nearly Rs. 4,000 and is only slightly above 1 per cent. New construction during the ten-year period between the two censuses of 1941 to 1951 is therefore unlikely to be more than 1·5 per cent of the existing estate. Therefore, even if we assume a life of a hundred or even two hundred years to the kind of rural houses that we have described above, the rate of new construction is obviously too low to meet the annual depreciation. It appears that here is a concrete illustration of a population living by capital consumption.

Acknowledgment

As noted in the introductory section, the principal interest of this study was methodological. From that point of view, a certain fact of our investigation deserves mention and notice. The entire investigation, including the actual measurements, drawings and quantity evaluations was done by a student of civil engineering, Mr. G. V. Joshi during his summer vacation. We sincerely thank Mr. Joshi for his painstaking and careful work and hope his efforts might direct the attention of the engineering students to problems of rural housing.

REVIEWS

Avantisundarī of Ācārya Daṇḍin, No. 172, Trivandrum Sanskrit Series, University of Travancore, published by SURANAD KUNJAN PILLAI, M.A. (Engl.), M.A. (Sansk.) and M.A. (Malay:), Hony. Director, University Manuscripts Library, Trivandrum, 1954, pp. 1 — 24 and 1 — 216. Price Rs. 4/-.

The volume under review is an important publication in the Trivandrum Sanskrit Series. Till now *Avantisundarī* of Ācārya Daṇḍin is known only by name and it has now seen the light of day in an imperfect form only, yet it would reveal many facts hitherto unknown to scholars. The manuscript material used for its publication is very defective in that it is fragmentary and full of *lacunæ*. Śri M. R. Kavi and Pt. S. K. R. Sastri have jointly published long ago in 1924 a fragment of the work which contains only the beginning of the work and a portion of *Kathāsāra* by a later writer. A more perfect but incomplete version of the Kathāsāra in verses has been published by Pt. G. Harihara Sastri in the J.O.R. Madras, as its supplement. All these indicate the imperfect nature of the manuscript material of both the *Avantisundarī* and its abridgment. In the present volume which contains the text for 216 pages, there is hardly one page without *lacunæ*. It is hoped that the vigorous search for valuable manuscripts all over India by scholars, and the authorities of various Universities, Research Institutes and Libraries may be successful in procuring good and more reliable MSS. of this important prose-work in Sanskrit.

The work *Avantisundarī* is ascribed to *Ācārya Daṇḍin, the great prose-writer and rhetorician in Sanskrit.* There is no doubt about Daṇḍin's authorship of this work as doubts are often expressed by scholars with regard to that of *Daśakumāracarita*—another important prose-work in Sanskrit. There is close similarity between *Avantisundarī* and *Daśakumāraracarita pūrvapīṭhikā* with some important deviations also, which are noted in this Introduction by Pt. K. S. Mahādeva Śāstri, the editor of this work. These similarities and deviations make scholars doubt Daṇḍin's authorship of the latter: Some are inclined to say that the whole of *Daśakumāracarita* is not by Daṇḍin while others opine that only the *pūrvapīṭhikā* of the work is not by Daṇḍin, etc. A few scholars however try to fix the authorship and date of Sanskrit works by *style* but such an attempt presents all kinds of difficulties if one and the same author is capable of writing different kinds of style—sometimes very simple and grand but some time very hard and ornate, according to the nature of the subject-matter and sentiments (*Rasas* and *bhāvas*). In addition to these two works in Sanskrit prose, Daṇḍin is known as the famous author of *Kāvyādarśa*, a standard work in Sanskrit Poetics. He is also ascribed another work *Dvisandhāna* about which very little is known. A few more works like *Chandoviciti*

are mentioned as the works of Daṇḍin. Pt. Mahādeva Śāstri discusses these points in his introduction and comes to the conclusion that Daṇḍin has written three works only (as Rājaśekhara has observed) and that they are *Avantisundarī*, *Kāvyādarśa* and *Dvisandhāna*.

About the date of Daṇḍin again, scholars have divergent views. The date, *viz.* the close of the *seventh* century or the beginning of the *eighth* century after Christ as suggested by the editor, can be accepted as the most probable one, since he places one Dāmodara, the great-grandfather of Daṇḍin, according to *Avantisundarī*, at about 600 A.D. when the Pallava king Simhaviṣṇu has ruled and had Dāmodara in his court as a *protégé*.

There are many interesting things in *Avantisundarī*. First, just like *Harṣacarita* it mentions and pays homage to many previous literary worthies or works such as the *Rāmāyaṇa*, the *Māhābhārata* and the *Bṛhatkathā*, the three great store-houses of stories and moral and spiritual maxims ; Subandhu, King Sarvasena (Pravarasena ?) the author of *Setubandha*, Bhāsa, Kālidāsa, Śūdraka, Mayūra, Bāṇa, and a few others. Again just like Bāṇabhaṭṭa in *Harṣacarita* he gives his autobiography to some extent which is very interesting and important. The editor Mahādeva Śāstri has given an account of it in his Introduction. King Simhaviṣṇu of Kāñcī was told by a Gandharva the genealogy of our author, Daṇḍin. In Ānandapura flourished a Brahman family of *Kauśikagotra* proficient in Vyākaraṇa and Mantraśāstra. In that family was born one Nārāyaṇa who performed many sacrifices and to him a son was born called Dāmodara. This Dāmodara was a great friend of poet Bhāravi and through him he made acquaintances with prince Viṣṇuvardhana with whom he had to go on a hunting expedition. At that time he made acquaintance with prince Durvinīta of Gaṅgā dynasty and he lived with him for a few years. During that time King Simhaviṣṇu sent message to Dāmodara to come to his court, and so Damodara came to Kāñcī and settled down there. He wrote several works, one of which is *Gandhamādana*. He married and got three sons, Simhaviṣṇu, Manoratha, and Atilobha. Manoratha got four sons—Dāmodara, Bhavadāsa, Simhaviṣṇu and Vīradatta. Vīradatta married one Gaurī and got a son called Daṇḍin (our author) along with a good number of daughters. At the age of seven, Daṇḍin had his Upanayana ceremony but soon he lost his father. He was forced to leave Kāñcī at that time, but he soon returned to the capital.

A renowned architect Lalitāditya came to Kāñcī to see Daṇḍin. He told Daṇḍin that he had joined a broken arm of the idol of Viṣṇu in Mahāmallapuram and requested him to see whether it was correctly done. Daṇḍin started with his friend Raṇamalla and he saw to the surprise of all that the arm was jointed so skilfully that one cannot even see where the arm had been broken. Daṇḍin was able to meet there his old friends Mātṛdatta and Devaśarman from Kerala. They saw a lotus flower being washed ashore from the sea and when it reached the feet of Lord Viṣṇu, it became a Vidyādhara who worshipped the Lord, but suddenly

disappeared. All were anxious to know the mystic significance of this wonderful event. They returned to Kāñcī and Daṇḍin performed a special *pūjā* of Lord Viṣṇu. At night he saw in a dream the goddess of Learning Sarasvatī who blessed him to get a revelation of the story of Rājavāhana, the king of Vidyādharas. Next morning Daṇḍin began to narrate the story of *Avantisundarī* to his friends. This is the gist of his autobiography and the source of his *Avantisundarī*.

There are many other interesting accounts of persons and places which are very valuable from the point of historico-literary Research. The work is unique in many respects and it is written in a lucid and grand style though it is interspersed in some places with somewhat long compounds. The section 'Lakṣmīviḍambana' pp. 44-48 gives a true picture of the evils produced by Lakṣmī—wealth and prosperity—in a man especially in a ruling prince and it resembles in many respects that which is found in *Śukanāsopadeśa* in the *Kādambarī*. Similar vivid and beautiful descriptions are found in abundance and they bring home to the readers many truths which have great practical value and utility in human life. It is needless to say that the book is worth studying by every student of Sanskrit for its exquisite beauty and wonderful diction and construction of sentences which have a rythm while reading.

The Hony. Director of Trivandrum University Manuscripts Library Śrī Śūranād Kunjan Pillai and the editor Pt. Mahādeva Śāstri are to be congratulated for having published this important prose-work of Ācārya Daṇḍin though the work has appeared in this edition in an imperfect form. It is hoped that the editors at Trivandrum would make a vigorous search for more complete MSS of this work at Kerala itself which is a rich store-house of many valuable manuscripts in Sanskrit and other languages and bring out a more complete and critical edition of this epoch-making prose work in Sanskrit.

V. A. R. SASTRI

Introduction to the Psychology of Music, by G. RÉVÉSZ. Translated from the German by G. I. C. DE COURCY. Pp. xiv + 261. London. Longmans, Green & Co., 1953. Price *Sh.* 30/-.

This book by Prof. Révész, one of the best on the subject, was originally written in Dutch and later in German under the title, "Einführung in die Musikpsychologie." The present English translation is from the German version. The English edition is not a strict translation but a revised work with the addition of a new chapter on "The Development of Musical Talent in Maturity and Advanced Age."

Considering the vast scope and vide intercalations of the subject of the psychology of music Prof. Révész is to be congratulated on a comprehensive and balanced treatment of it.

The book is divided into three parts as under:

Part I: Physics and Physiology of Sound
Part II: Psychology of Sound
Part III: Psychology of Music.

In Part I are studied the basic elements of acoustics and physiology of sound production and perception: (*i*) the nature of physical vibrations—frequency, amplitude and formant and their psychological correlates—pitch, loudness and tone quality—(*ii*) the auditory apparatus, (*iii*) the human voice.

The literature on this subject is indeed vast and the author has done well in summarizing it and giving the bare essentials necessary for the study of the psychology of tonal perception and music. This is indeed a refreshing aspect of the book. More often than not as we go through a modern book on the psychology of music we feel as if it were a treatise on acoustics. Elaborate data and inferences of acoustical analysis of tonal stimulus (musical instruments and vocies) are given, as if this were the most important part. Because measurement of the stimulus is not very difficult (and to most researchers measurement has come to mean understanding) more research is directed towards this. Though there are no watertight divisions in knowledge, most of such work should be relegated to acoustics. Révész has therefore kept the proper perspective and treated this part with the necessary brevity and succintness.

There are, however, some discrepancies. For instance, the complex sound of any vibrating body registers a complex wave form on any registering mechanism. It is possible to analyse such a complex wave form into simple sine-curves completely. This is the usual procedure followed in most acoustical studies and Révész makes out that the analysis represents the tonal structure of the body (p. 4). This is not the case in actuality. Fourier analysis is only *one of the many mathematical analyses* of a wave form and does not necessarily represent the actual

physical state. Gemelli and Scripture have shown the inadequacy of Fourier analysis for speech. Specially when there are definite inharmonies Fourier analysis is completely inadequate. The present reviewer in his studies on the tonal structure of the *Tambura* has shown the presence of such inharmonics and the consequent inapplicability of Fourier theorem for such analysis.

Again, there is confusion about intensity and loudness (p. 6). The loudness of a tone does not increase directly with the square of the amplitude, but it is intensity that is so related to amplitude. Intensity is a physical characteristic of sound related directly to amplitude. But loudness is a psychological characteristic which though mainly related to intensity is also closely dependent on the pitch and quality of a tone. (The interested reader may study the work of Harvey Fletcher and others in this field).

There are a few minor errors and uncommon usages : equating the ordinal number of harmonics and partials (pp. 10-12), undertones instead of sub-harmonics (p. 13) and differential tones instead of difference tones (p. 17). (The term differential tone is used even by Barton in his Text Book of Sound ; but the more common current term is difference tone).

There is also a brief and good discussion of musical scales. An interesting feature is the reference to scale construction by Farey series (" all non-reducible fractions capable of numerical representation as not greater than an arbitrary number n "), (p. 25), which is not usually met with. As usual with most Western books on music there is not even a mention of Indian musical scales—one of the most developed in the world. It is, however, refreshing to find Révész positively asserting the æsthetic poverty of the tempered scale (p. 31).

The chapter on hearing is brief. But it gives a good introduction to the study of audition for a beginner. The survey includes the older theories of Helmholtz and Ewald and most recent ones of Meyer, Fletcher and Bekesy. Again Révész reveals his open mind and balanced judgment by recognizing that these theories operate only at the very peripheral levels of physics and physiology and have yet to touch the levels of psychological perceptions (pp. 7 and 36).

The last Chapter in this part is on voice. This is a very brief one. The discussions are not very illuminating and of very little relevance to music or psychology. There are the usual discussions of the theories of Helmholtz, Hermann, Stumpf etc. The recent brilliant and fruitful theory—the Alpha-Phoneme theory—of Sankaran finds no mention. (The details of Prof. Sankaran's theory may be found in his numerous publications from the Deccan College Research Institute, Poona).* A discussion—at least in brief—of voice quality and physiology of voice production would have been of much use.

* "Phonemics of Old Tamil " (Decc. Coll. Monogr. Series, No. 7, 1951). " Time & Speech Structure " BDCRI, XII. 1952, pp. 394 *ff*.

Part II forms the most important part of the book. In it is expounded in detail the two-component theory of Révész. Of all his contributions to the psychology of music this may be ranked as the most significant.

One of the most important characteristics of a tone is what we call its pitch. That is, its position along a *linear* order of ascent. No other attribute of a tone has so unique a differentiative character. So that a musical movement—a tonal progression—is sufficiently defined by a pitch scale alone (one component theory).

On the other hand, the question is whether the one-component theory is a sufficient tool? Consider an ascending series of tones; the higher we are from where we started (the tonic) the more dissimilar the tone (from the tonic) we find —*e.g.* Sa, Ri, Ga, etc. However, there comes a point when the tone we reach is in some way so similar to the tonic that we consider it for all purposes to be equivalent to the tonic and even give it the same name: *e.g.* Sa—Ṡa. By the one-component theory Ṡa should be more different from Sa than Ni (from a Sa), as it is higher in the scale. But yet it is the closest to Sa from all other notes. That is, it is somehow of the same quality. Révész calls this quality as equivalence. Thus a tone is definable by two factors (two-component theory)—its position along the ascending (pitch) scale and its equivalence (quality).

Thus a tonal sequence (which is represented as a straight line in the one-component theory) can be represented as an ascending infinite spiral the axis of which is vertical. If we travel one spiral we would have ascended an octave; we will reach a point exactly vertically situated above the starting point which is (1) farthest from the starting point as we travel along the spiral but (2) yet the closest to it along the vertical direction.

The phenomenon of octave relationship and equivalence is not new but, perhaps, as old as music itself. Révész presents it in a very new light and explains many musical facts by this theory.

The octave phenomenon (and also consonance-dissonance) was explained by Helmholtz (similarity and coincidence of harmonics) and Stumpf (fusion). Révész shows the inadequacy of these theories and points out the greater sufficiency of his two-component theory.

He shows that the two components—pitch and equivalence—are separable. Further he shows the fruitfulness of his theory in the understanding of the octave phenomenon, theory of intervals, consonance, absolute pitch, amusia (a pathological state of loss of memory for musical relations) and etc. There is no doubt that this is indeed a fine contribution.

On close examination there is one aspect of this theory that still remains to be fully explained. Though a distinction has been made between pitch and tone

quality (not to be confounded with timbre) no physical correlate for the latter has been definitely shown. Now for pitch there is frequency, for loudness there is amplitude (intensity) and for timbre there is formant. (Of course these psycho-physical relations are not completely independent and are mutually related). But for what Révész has termed the quality (of equivalence) there is no physical correlate.

As we think over the problem of octave repetition we see the closeness of it to the periodic table of elements. As a matter of fact, this resemblance between the musical octave and the periodicity of physico-chemical properties was observed by the early propounders of periodic classification of elements. The latter has found a very satisfactory explanation in the modern physico-chemical theories of atomic structure.

May we not then find a similar answer to the 'Cyclic' property of tonal progression? Further may not all phenomena be spirally recurring? Strictly, if all phenomena are spirally recurring there is no means of returning to the starting point. There is only a closeness and no identity between the start and finish of the 'cycle'. Cyclic phenomenon, where the start and finish are identical, is only an illusion due to the bondage of time. In the fullness of experience, there is always a gap between the two; hence, the spiral and not a circle in tonal progression. This is the break between the temporal and non-temporal, yet this is the connection, bound yet not bound in time. This is the æsthetic state. The 'Sruti' of our music is this 'unit' of transition. (In the theory of Sankaran this is the alpha-phoneme).

This part also includes a Chapter on colour-sound relation.

In Part III there are discussions of the various problems of psychology of music. Included in this are the problems of musicality, musical talent (its development, maturity, musical prodigies, relation of musical talent to other talents), inheritance of musical capacity, musical capacity of deaf people, pathology of musical perceptivity, origin of music, æsthetics and its relation to psychology of music.

In the chapter on musical talent Révész points out that mere physiological capacities such as pitch discrimination, sense of absolute pitch, rhythmic response are no valid criteria of musical capacity. A musician may lack many of these and yet be very creative; he may be richly endowed with most of these physiological advantages and yet be a mediocre creative musician. Creativity and physiological advantage are different things; the latter being only a tool for the former. This is indeed a refreshing departure from most of the current psychological trends which seem to feel that a measure of musical talent (if there could be a measure at all) consists in the measurement of physiological limitations, and scopes.

Some sections call for special attention.

THE DIRECTOR OF ... 26 AUG 1969 GOVT. OF MADRAS

In the section on the development of musical capacity Révész points out the similarity between the music of children and of primitives and warns against hasty theorizing from outward similarities. One such similarity is the descending trend of melody, dependent on the tensions on the vocal chords. Again, around the sixth year of child's life, is the most significant period for musical development (p. 175). According to Révész about this age children begin to develop tonic-consciousness. "The tonic becomes the centre from which the melodic movements flow and to which they again return." This is indeed significant in the light of what the present reviewer wrote about the emergence of the drone in Indian music (Journal of Music Academy, 1952).

There is a brief discussion on the nature of creative activity in music. What, for instance, is the rôle of inspiration and labour in creative work?

No amount of such discussion of choice, I think, is of value. Firstly we have not much knowledge about what goes under the name of inspiration. Though often it is nothing more than flimsy short-lived sentimentality, there are sources—unconscious and superconscious—which drive us to activity and the causal antecedents of which we know little; and it is these that form the core of 'inspiration'. On the other hand there is the part of labour in all artisic activity. This consists in the perfection of technique, constant study and rumination. This is essential in one sense. A good technique is necessary to acquire mastery over the medium of expression. Study and rumination help to keep the conscious mind constantly on the alert. It is after long rumination and meditation when conscious mind is silent that other forces take over and one is inspired to create.

But creative state of mind is somethng else. It is not the source of activity; neither is it the emotional activity of the artist. It is an awareness of all this—a detached state that observes and is not involved.

In the modern world of hurried activity and advertisement, virtuosity has naturally found favour with artists as well as audience. It is but natural that virtuosity and creation are equated, specially in our country—from the topmost to the lowest.

Once again Révész shows his balanced judgment and insists on the necessity of a spiritual foundation for artistic activity.

The chapter on the pathology of musical perceptivity is brief and interesting but the related subject of therapeutical value of music has not been touched at all.

The chapter on the genesis and origins of music is not very convincing. The author discusses the various theories regarding the origins of music; theories of mating call, of imitation, of work and dance rhythm, of emotional speech and etc.

He puts forward his own theory of wordless signal. In short it consists of the following factors : at the base is the need for mutual contact and understanding (perhaps what is generally called the gregarious instinct). When the person to be contacted is far away a call is the best method, before proceeding to worded signals. Révész shows that the call (wordless) signals have many characteristics common with primitive music.

Such approaches are superficial. After all speech—whether worded or not—and singing are various types of vocal signals and modes of behaviour and are bound to have many tonal characteristics in common. Even the source may be common.

The characteristics common to call-signals and primitive singing are of tonal patterns. Now, such commonness of patterns does not necessarily mean that one is the origin of the other. For instance work habits do impose patterns—patterns of repetition and emphasis—on music. This can be seen in all folk-music and dance. But surely work habits definitely are not the origins of music. So with call-signal pattern.

But the emotional sources of music are much deeper than call signals, and surely it is a mistake to attribute to the latter the function of origin of music.

If at all the origin of music—for that matter any human activity—is to be sought for it should be ' below ' and ' above ' the conscious levels. Depth psychology could help us much : the obvious source is oral frustration and the rhythm of sucking. Anton Ehrenzweig in his recent book " The Psychoanalysis of Artistic Vision and Hearing " (Routledge, Kegan Paul) shows the bifurcation of choice in erecting a " thing-constancy " of tonal characteristic and the development of speech and music. Even deeper frustrations than the oral and anal are probable sources of emotional expression.

' Above ' the conscious level is the super-conscious correlates of sound and thought. Nāda-utpatti is the original source of all tonal experience. The primary motion (Spanda) is the source of all perception and experience. Hence the high place given to music in our country (at least among some).

But it occurs to me that it is futile to search for origins. Origin implies causality—causes and effects and antecedents. Now such relations are true only at certain levels of experience—within the limits of time, at whatever level that may be. However, if one is honest and alert one always meets at the end a sudden brink and jump that throws one into that which is causeless, which is " truer " than the causal, temporal experience.

If, therefore, this ' causeless ' is ' truer ' where is the point in searching for the cause, origin and evolution of things ?

By explicit intention Révész has left out all discussion of æsthetics. He rightly points out (p. 242 ff) that physiological effects and even emotional effects do not strictly form the core of æsthetic response. This again is a welcome departure from the absurd naivity of modern psychological trends of behaviourism and measurement.

One wishes that some mention at least were made of the effects of music—specially the psychological effects in therapeutics and industry.

But the most serious lack in the book is the study of rhythm. This is so vital a part of music that such an omission is indeed very regrettable.

The book is definitely one of the best on the subject—comprehensive, lucid (in spite of the strained language in parts) and balanced. It should be studied seriously by all interested in this field. The author has surely succeeded in his attempt " to furnish a picture of the trends and results of research in the psychology of music as well as to awaken an active interest in this borderland of psychology and musicology."

B. Chaitanya Deva

Geschichte der Indischen Philosophie, von Walter Ruben, pp. x and 351, Deutscher Verlag der Wissenschaften, Berlin, 1954. Price DM 12.50.

It is an extremely painful task for a student of Indian thought to have to review Ruben's latest work on the history of the Indian philosophy, not only because it shows nakedly the ruin of a remarkable talent, but also because it tries to involve the reader, and so the reviewer, in a political faith. This book of the present Professor at the Humboldt University in East-Berlin is tendentious to an incredible extent. It is comparable only to Mayo's Mother India (which at least had no scholarly pretensions) and treatises by certain German professors writing since 1933. The peaceful scholar is again forcibly dragged into world politics, now those of 1954 A.D.. Whoever might have hoped to preserve the precarious intellectual quiet of his workshop is once more driven into the open to defend the basic principles of intellectual honesty and integrity.

" The Marxist-Leninist postulates his materialistic partiality, for he is conscious of the fact that only the view-point of the Workers Class, which he represents, is the sole objective view-point that recognizes Society, its foundation and superstructure, for what they are in their historical obedience to fixed laws (*in ihrer historischen Gesetzmäszigkeit*) : for only the Workers find it their interest to see to it that nothing is obscured, that the rôles played by Materialism and Idealism in their fixed relationship to distinct social classes (*Klassgebundenheit*) are completely revealed." (p. 7).

This sublime faith in the infallibility of the partisan views of an undefinable and undefined mass is founded on the creed that all ' idealistic philosophies '

(that is all philosophies which cannot be regarded as Historical Materialism, or as more or less primitive forms of the same) have always and everywhere served the sole purpose of justifying and perpetuating the exploitation of the available Lower Classes. This is held particularly true of Indian philosophy, from Yājñavalkya to Gandhiji, which if anything is patently non-materialistic. Hence the macchiavellian USA imperialists encourage the publicizing of those perversions of mind, to wit tranquillity, renunciation, contemplation, contentment as taught by the Indian philosophers, and they 'have books of Indian "Wisdom" translated into English, trade them through the Vedānta Press in the movie-town Hollywood, have them re-translated into German in Switzerland, and throw them on the Western-German market' (p. 17). Needless to say that during this process all truly philosophical, i.e. materialistic, thought as preserved in some Upaniṣad speculations is carefully falsified or suppressed by the swindlers (p. 26). Anticipating the present struggle between Idealists and Materialists, Indian as well as Western students of Indian thought have consistently underestimated or explained away the little materialistic evidence that had escaped the malicious scrutiny of the idealistic Brahmans. Now at last they are exposed for the reactionary bourgeois they are, and Indian Idealism is faithfully debunked.

However, neither Marx, nor Engels, nor Lenin, nor Stalin have pronounced their views on Indian philosophy (p. 16); but fortunately another authority, Shdanow, has lately laid down the canons of orthodoxy for studies in this field: "The scientific history of philosophy is the history of the conception, origination and development of the scientific materialistic *Weltanschauung* and their laws. To the extent that Materialism grew and developed in its struggle with Idealistic trends is the history of thought the history of this struggle of Materialism and Idealism." (pp. 16-17).

RUBEN's orthodoxy now warranted, the rest is plain sailing. And plainly he sails. With a half-hearted attempt at self-criticism he allows that his exposition may not be immediately and entirely convincing; but that is not *his* fault: continued study will, nay must, reveal missing links and fill up the gaps, for the pattern (*Shdanow dixit*) is invariably right (Vorwort).

So the first human philosopher (p. 25) was Uddālaka whose materialism (*hylozoism*: Ruben rectifies his pre-Marxist error of calling it by the bourgeois term *realism*, p. 25), albeit crude, contained the seeds of true historical materialism (p. 25; 87 ff). But thenceforth, in spite of earnest attempts time and again that were spitefully frustrated by the exploiters and the despots, it is a sad story. The priests ever anxious to safeguard their precious privileges to the detriment of the heel-trodden people, playing up to the tyrants, continuing the 'magic of the brāhmaṇas' ('texts of the beginning of primitive slaverdom of the Iron Age'), waxing fat and rich (with that double standard so characteristic of Indian ethics, p. 97) on the preaching of a perverse quietism intended only for the suffering and the exploited (on Yājñavalkya, p. 97; 99 f.), cleverly propagating the karman and

THE DIRECTOR ... 26 AUG 1969 ... GOVT. OF MADRAS

saṁsāra doctrines to keep the down-trodden populace in check, every now and then flinging at them a Personal God or two to keep their sense of hierarchy intact (on Rāmānuja p. 282 ff.); the kings (tyrants/despots) availing themselves of the services of the priests, taxing, treading, luxuriating etc. (p. 102; passim); the merchants like the Jainas developing most of their practices to keep their properties safe (p. 123-31); all of them conspired (and conspire now) to suppress whatever evidence of a truly democratic Materialism happened to survive, nipping in the bud whatever revolutionary thoughts threatened to arise. No doubt Tagore and Gandhi had a go at the amelioration of prevailing social conditions, but the former was after all a rich man of *zamīndār* extraction (p. 333), and the latter lost the chance of standing up to historical-materialistic expectations during the anti-fascist struggle World-War II (exposed pp. 334 ff.) and 'his philosophy is no more than an adaptation of the ancient quietism of the priest to the modern conditions of India, as well as to the needs of the Upper Middle Class (*Groszbourgeoisie*) in the period of the general Crisis of Capitalism (p. 340)'. Whatever integrity Gandhi managed to preserve is now being peddled by the Congress Party to Capitalists and Landlords who subsidize not only the Gandhi cult, but also conspire 'with the Ramakrishna Mission, with that centre of Cosmopolitanism the UNESCO', not to speak now of American and British Monopolists, 'in order to maintain "Peace and Order." But the *Marxismus-Leninismus* exposes them ever more in the eyes of the Indian Workers and the Friends of Peace all over the world (*ib.*)'.

A sad story indeed, so earnestly studied by 'liberal, bourgeois, imperialistic exploiteristic' students of East and West. Vainly does Von Glasenapp expect that Indian Philosophy will not succumb to Western thought but remain faithful to its ancient wisdom, "but we pose, as against this reactionary wish-dream, the scientifically founded confidence that the Indian Peoples will in the near future win the struggle for truly national and social freedom and destroy all superstition which checks their social progress (p. 34)'.

One can abstain from argument in reviewing this incredible book. Quoting suffices. But, whoever thinks that an extremely complicated and subtle study such as that of Indian thought has any help to derive from the hatchet of an admittedly aggressive and hostile mentality; whoever hopes that the noise of incessant abuse will carry any authority in the quiet of a scholar's workshop; whoever endeavours, by consistently and consciously distorting demonstrable facts, by showering unproven opinions about subjects of which he lacks the most elementary erudition, and by quoting in support certain authorities who may have made history but none in research, to convince anyone not already convinced before,—he will meet with silence, a silence pregnant with memories of some two decades back. And the incorrigible liberal indologist who had hoped that the recent cultural *rapprochement* between India and Eastern-European countries might result there in a revival of a great indological tradition silently buries another illusion.

J. A. B. VAN BUITENEN

DECCAN COLLEGE MONOGRAPH SERIES

1. *Panipat* 1761—By T. S. Shejwalkar. Crown 4to, pp. 141 and 9 maps. 1946. Rs. 12/-. [M 1].

2. *Anthropometric Measurements of the Marathas*—By Iravati Karve. Crown 4to, pp. 71 and 4 plates. 1948. Rs. 8/-. [M 7].

3. *Studies in the Historical and Cultural Geography and Ethnography of Gujarat*—By H. D. Sankalia (being the Thakkar Vassonji Madhavji Lectures for 1944 at the University of Bombay). Crown 4to, pp. xvi + 245 and 3 maps. 1949. Rs. 15/-. [M 11].

4. *Etched Beads in India*—By M. G. Dikshit. Crown 4to, pp. viii + 79 and 19 plates. 1949. Rs. 10/-. [M 13].

5. *Report on the Excavations at Brahmapuri in Kolhapur*—By H. D. Sankalia and M. G. Dikshit. Crown 4to, pp. xvi + 154 + 37 plates. 1952. Rs. 30/-. [M 15].

6. *Stone Age and Pleistocene Chronology in Gujarat*—By F. E. Zeuner. Crown 4to, pp. 46 + 11 plates. 1950. Rs. 8/-. [M 17].

7. *Phonemics of Old Tamil*—By C. R. Sankaran. Crown 4to, pp. vi + 71 + 2 plates. 1951. Rs. 8/-. [M 18].

8. *Anthropometric Measurments of Mahārāṣṭra*—By I. Karve and V. M. Dandekar. Crown 4to, pp. vi + 134 + 2 maps + 24 plates. 1951. Rs. 12/- [M 20].

9. *Nagpur Affairs*—(Selections from the Menavali Daftar)—By T. S. Shejwalkar. Royal 8vo, pp. lii + 450. 1954. Rs. 15/-. [M. 25].

10. *Godavari Palaeolithic Industry*—By H. D. Sankalia, Demi 4to, pp. ii + 59 + 49 figures. 1952. Rs. 12/-. [M. 28].

11. *Kinship Organisation in India*—By Iravati Karve. Crown 4to, pp. x + 304. 1953. Rs. 15/-. [M. 41].

12. *High-School Students in Poona*—By I. P. Desai, Crown 4to, pp. x + 123. 1953. Rs. 10/-. [M. 44].

13. *Excavations at Nasik and Jorwe*—By H. D. Sankalia and S. B. Deo. Crown 4to, pp. xv + 177 + 35 plates and 94 drawings. 1954. Rs. 45/-. [M. 45].

DECCAN COLLEGE DISSERTATION SERIES

1. *Historical Grammar of Old Kannaḍa* (based entirely on the Kannada Inscriptions of the 8th, 9th and 10th centuries A.D.)—By G. S. Gai. Royal 8vo, pp. xvi + 232. 1946. Rs. 15/-. [D 2].

2. *Cultural History from Vāyu Purāṇa*—By D. R. Patil. Royal 8vo, pp. xviii + 348. 1946. Rs. 15/-. [D 3].

3. *Historical Grammar of Inscriptional Prakrits*—By M. A. Mehendale, Royal 8vo, pp. xi + 345. 1948. Rs. 21/-. [D 5].

4. *Juvenile Delinquency and Destitution in Poona*—By Mrs. G. N. Ruttonsha. Demi 8vo, pp. 180. Rs. 8/-. [D 6].

5. *Historical Grammar of Apabhraṁśa*—By G. V. TAGARE. Royal 8vo, pp. xviii + 454. 1948. Rs. 21/-. [D 8].

6. *Verbal Composition in Indo-Aryan*—By R. N. VALE. Royal 8vo, pp. xii + 324. 1948. Rs. 18/-. [D 9].

7. *Stone Age Cultures of Bellary*—By B. SUBBARAO. Royal 8vo, pp. viii + 62. Rs. 8/-. [D. 12].

8. *Citations in Śābara Bhāṣya*—By D. V. GARGE. Royal 8vo, pp. xii + 312. 1952. Rs. 16/-. [D. 19].

9. *Ṛgvedic Legends through the Ages*—By H. L. HARIYAPPA. Crown 4to, pp. xxii + 123-330. Rs. 15/-. [D. 30].

10. *Evolution of Malayalam*—By A. C. SEKHAR. Crown 4to, pp. viii + 220. 1953. Rs. 16/-. [D. 31].

11. *Nominal Composition in Indo-Aryan*—By G. V. DAVANE. [D. 32] (*In Press*).

12. *The Judicial System of the Marathas*—By V. T. GUNE. Crown 4to, pp. xxxv + 391 + 2 maps + 1 plate. 1953. Rs. 20/-. [D. 37].

13. *Linguistic Peculiarities of Jñāneśvarī* (with Index Verborum)—By M. G. PANSE. Royal 8vo, pp. xiii + 655. 1953. Rs. 20/-. [D. 38].

14. *A Concordance of Sanskrit Dhātupāthas* (with Index of meanings)—By G. B. PALSULE. Crown 4to, pp. iv + 203. 1955. Rs. 12/-. [D. 51].

15. *Pleistocene Studies in the Malaprathā Basin*—By R. V. JOSHI. [D. 52]. (*In Press*).

DECCAN COLLEGE HAND-BOOK SERIES

1. *Prehistory in India.* Four Broadcast Talks on Early Man—By F. E. ZEUNER. Crown 8vo, pp. 39 + 16 plates. 1951. Rs. 2/8. [H. 22].

2. *Archaeology and Indian Universities*—By H. D. SANKALIA. Demi 8vo, pp. 17. 1952. As. 8.

3. *The Grammatical Structure of the Dravidian Languages*—By JULES BLOCH (Authorised English translation from the original French by R. G. Harshe). Demi 8vo, pp. xxxiv + 127. 1954. Rs. 6/-. [H. 42).

4. *An Introduction to Indian Textual Criticism* (2nd edition)—By S. M. KATRE. Demi 8vo, pp. xvii + 148. 1954. Rs. 6/-. [H. 46].

5. *Dhvanivicāra* (Marathi Phonetics)—By N. G. KALELKAR (*In Press*).

6. *Lectures in Linguistics*—By Oscar Luis CHAVARRIA-AGUILAR. Crown 8vo, pp. 128. 1954. Rs. 4/-. [H. 48].